



Accelerated Bridge Program Bi-Annual Project Controls Progress Report

Pursuant to Section 17 of Chapter 233
of the Acts of 2008

Submitted By:

Accelerated Bridge Program Oversight Council
December 15, 2010

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Introduction

This report is filed as a progress update on the state of project controls implementation within the Accelerated Bridge Program, as required by Section 17 of Chapter 233 of the Acts of 2008.

Central to the mission of the Acts of 2008, and the Acts of 2009, are the requirements for transparency, accountability, and performance management in all aspects of capital project and program management. As a result, budgeting, cost controls, and schedule controls will go beyond minimum industry standards for project development and delivery, and include an ongoing focus on public reporting. Chapter 233 of the Acts of 2008, which authorized the Accelerated Bridge Program, specifically required the implementation of effective project controls to ensure adequate tracking and reporting of program progress, cost and schedule. To fulfill the requirements at the onset of the ABP, three working groups were formulated with a composition of MassHighway staff, Department of Conservation and Recreation staff and a project controls consultant. These groups were comprised of diverse experience/departmental background, to evaluate all of the key aspects of what makes a project successful. The working groups completed their tasks by November 24, 2008 and the final recommendations were approved by ABP senior management for inclusion in the December 15, 2008, filing of the Project Controls Report. As this report now requires an update two years later, it should be noted that project controls have not only been implemented on ABP projects. It was always anticipated that MassDOT would advance these same principles into other areas of the business, and project controls are being applied to other MassDOT programs.

In September, the Accelerated Bridge Program (ABP) celebrated the conclusion of the first two successful years of the program, and the implementation of many controls systems played no small part in this success. Project goals have been set and monitored, performance measures have been established, Program budget allocations, cash flow, and schedule have been monitored, with robust reporting, that has routinely been presented to ABP management, the Oversight Council, industry stakeholders, and the general public. This has allowed all parties to discuss goals, objectives, progress, and items of concern, and has ensured a timely response to those concerns. Most importantly, all of these project controls tools have aided in the control the Program.

Of note, since the original Project Controls Report was filed in December 2008, the former Massachusetts Highway Department (MassHighway) has been joined with other state transportation agencies to form the new Massachusetts Department of Transportation (MassDOT). In addition to this consolidation of agencies into one entity, many of the bridge assets that were formerly under the care and control of the Department of Conservation and Recreation (DCR), have been transferred to the new Massachusetts Department of Transportation. This consolidation of agencies directly impacted all aspects of the Accelerated Bridge Program, as the bridge projects and active contracts, procedures, standards, funding, departments, and personnel, were required to be seamlessly integrated and managed during this transition.

Prior to the formation of MassDOT, both DCR and MassHighway had begun to develop and implement Project Controls policies and procedures, specifically tailored to their own agency's needs while complying with the adoption of the requirements that were approved by the Oversight Council in the

December 15, 2008 Project Controls Report. Working with the independent Project Controls team, each agency had reviewed their current business process, staffing levels, contract language and contracting capacity, to determine how best to implement controls. Consequently each agency reported their progress of projects independently to the Project Controls team, and the data was integrated to reflect the ABP Program as a whole. On November 1, 2009 MassDOT assumed responsibility for all of the outstanding ABP bridge projects and contracts, executing an Interagency Service Agreement with DCR to fund \$34 Million worth of bridge improvements on the assets still under DCR's control. From that point forward a unified approach to project controls was implemented. Consequently for simplification throughout this report, when "MassDOT" is used, this includes reference to MassHighway and DCR, formerly known as the ABP "Agencies".

There have been many successes in the implementation of Project Controls, and these past two years have also been a learning experience. It has taken time to determine which project controls initiatives could be easily implemented, which would be worthwhile, but difficult to implement, and which controls were not feasible or cost beneficial at this time.

In July 2009, the ABP Project Controls Unit (PCU) was initiated through the activation of a contract with Keville Enterprises, Incorporated to supply the initial skilled personnel and knowledge base that is required to implement many of the project controls elements discussed in the December 2008 Project Controls Report. Under the daily management of a MassDOT Project Controls Manager, the PCU currently performs much of the monitoring and reporting functions that will eventually be transitioned to full-time MassDOT employees, once an extensive training program initiative has been completed.

Section 1 – Cost Control

1.A – BUDGET AND REPORTING

1.A.0 – Summary

Quality procedures for project control and record keeping, are indispensable tools for managing the planning and execution of a large program. These tools serve the dual purpose of recording the financial transactions that occur, while providing managers with a timely indication of the progress and problems associated with the program. Cost and schedule management will produce a positive outcome when it effectively aligns the demands of the project objectives, legislative and public expectations, and fiscal prudence.

MassDOT and its Project Controls Unit, have fulfilled the reporting requirements of Chapter 233 of the Acts of 2008, and have set up a multi-tiered reporting approach so that all stakeholders of the ABP can readily access the information.

1.A.1 – Reporting Goals

The reporting program that has been implemented by MassDOT provides the primary tool to manage the budget, so that the overall program (as well as each project) is within the total allocated Program budget. It also allows all stakeholders to have access to accurate/current project schedule and budget information.

A multi-tiered reporting approach has been implemented that includes many of the performance tracking indicators that were identified in Chapter 233 and as part of the original Project Controls Report filed in December of 2008. These performance indicators have become the basis for the data presented in the ABP oversight and performance management reports. Monthly, quarterly and semi-annual reports are regularly reviewed with members of the ABP management team, to ensure that all required data is being captured and presented in an accurate, concise and clear format. In addition, MassDOT uses web-based reporting to allow anyone to find up-to-date information on the status of each bridge project as well as the Program as a whole.

1.A.2 – Performance Tracking Indicators

MassDOT has initiated a formal Performance Tracking Indicator (PTI) program for portions of the legislative reporting requirements. Control Measures, also known as program performance measures, are baseline units used to measure performance outcome. Control Measures have been established for cost and time on many of the projects included in the Program. These Control Measures are ideally developed using the 75% design stage documents, allowing for ample design document maturity, which ensures reasonable construction cost estimates and schedules can be created. 75% design is still early enough in the process however, to allow ABP managers to implement corrective/recovery options prior to bidding the work. It should be noted that because the program was well underway prior to formal PTI measures being established, many of the Control Measures needed to be developed using later

design phase documents and estimates. In some cases, these performance indicators were set based on the individual projects pre-bid information that was formally submitted to the MassHighway/DCR procurement groups.

Through the establishment of these Control Measures, reports have been generated using this information as a basis to track how projects are performing as they mature from design through the procurement and construction life-cycle. On a Program of this size, it is essential that managers quickly identify any problem areas that require attention. Information needs to be communicated in a concise format that will allow them to quickly identify the current state of the individual projects as it relates to the Control Measures established.

Section 1.B.1 describes three performance scorecards that are being used on the ABP for the “on-time/on-budget” requirements. Each one of these performance readings has an individual purpose and is an important aspect of the program management and reporting.

Below is an example of the reporting that has been implemented to communicate current forecasts as they relate to the Control Measures. Projects are grouped by demarcated life-cycle phases such as “In Design” and “In Procurement”, colored indicators or “traffic lights” are used to quickly identify status, and much of the comparative information is available on a single line to provide the manager with quick reference to the pertinent information.

Program Performance Indicator Report

(All Projects with Control Measures Established)

Notes

- Current Forecast data is through November 2, 2010
- Control Measure - Estimate : The Control Estimate is a Program level 'performance indicator' and budgetary tool, which is developed after the conceptual design and prior to bidding. The Control Estimate is ideally developed using the 75% design stage documents, which allows for ample design document maturity to develop a reasonable construction budget and, at the same time, is performed early enough to allow for design managers to provide cost recovery ideas, prior to bidding the work (if warranted by results of later more costly cost estimate projections).
- Control Measure - Schedule: The Control Schedule is a Program level 'performance indicator,' which is developed after the conceptual design and prior to bidding. The Control Schedule is ideally developed using the 75% design stage documents, which allows for ample design document maturity to develop a reasonable construction schedule and, at the same time, is performed early enough to allow for ABP managers to implement corrective/recovery options, prior to bidding the work (if warranted by results of later Schedule assessment that shows a longer projection of construction duration).
- Current Forecast - Estimate: This value is the construction cost projection for the project based on Original Contract + Executed Change Orders + Pending Change Order Estimates
- Current Forecast - Schedule: This date is the original contractual completion date + Executed Time Extensions + Pending Time Extension Estimates
- "Current Forecast" and "Expended" values for former DCR projects transferred as part of the MassDOT integration are currently under review by MassDOT, and any required adjustments will be reflected in future reports.

Project ID	Project Description	Control Measure	Current Forecast	Current vs Control Performance	Expended	%	Remarks
Substantially Complete							
605531 DCR	EVERETT- MEDFORD- STRUCTURE MAINTENANCE, E-12-004-M-12-018, REVERE BEACH PARKWAY (ROUTE 1B) OVER THE MALDEN RIVER (WOODS MEMORIAL DRAW	Estimates: \$1,570,800 Schedule: 12/31/2009	\$3,747,805 12/31/2009	138.6% 0	\$2,824,219	75%	Additional interim repairs due to accelerated deck deterioration.
605057 MHD	CHICOPEE-WEST SPRINGFIELD- BRIDGE PRESERVATION, C-13-034-W-21-043, I-91 OVER CONNECTICUT RIVER	Estimates: \$1,831,944 Schedule: 10/27/2009	\$3,871,320 12/17/2009	111.3% 51	\$3,881,457	100%	Low bid was \$3,329,637.50. Designer did not include shielding/containment.
602570 MHD	SPRINGFIELD- BRIDGE BETTERMENT, LONGHILL STREET (NB & SB) AND ROUTE 5 OVER I-91, INCLUDES S-24-049, S-24-050, S-24-051	Estimates: \$3,262,772 Schedule: 11/19/2010	\$5,473,285 8/17/2010	67.7% -94	\$5,044,958	92%	Low bid was \$3,890,085.00. Additional deteriorated steel repairs required.
605507 DCR	BOSTON- CAMBRIDGE- SIDEWALK REPLACEMENT, B-16-007, ROUTE 2 OVER SOLDIERS FIELD ROAD & CHARLES RIVER (BU BRIDGE)	Estimates: \$2,244,000 Schedule: 7/31/2009	\$3,389,144 6/20/2009	51.0% -41	\$1,944,064	57%	During initial construction, additional areas of work were identified.
605525 DCR	BOSTON- STRUCTURES MAINTENANCE, (B-16-462, B-16-457) STORROW DRIVE WEST BOUND OVER STORROW DRIVE EAST BOUND	Estimates: \$12,903,000 Schedule: 10/30/2009	\$15,250,000 6/19/2009	18.2% -133	\$11,425,748	75%	Additional scope added.
603290 MHD	SPRINGFIELD- BRIDGE PRESERVATION, S-24-068, LIBERTY STREET OVER ROUTE I-291 AND S-24-069, ARMORY STREET OVER ROUTE I-291	Estimates: \$4,282,919 Schedule: 6/1/2011	\$4,860,307 10/29/2010	13.5% -215	\$4,182,013	86%	Low bid was \$4,360,510.00. Additional ADA requirements were not included in base bid.
605509 DCR	BOSTON- BRIDGE REPLACEMENT, B-16-365, BOWKER OVERPASS OVER STORROW DRIVE	Estimates: \$5,632,000 Schedule: 10/23/2009	\$6,056,302 6/30/2009	7.5% -115	\$6,056,302	100%	

Legend

●

 Estimate
Current Forecast is within Control Estimate

▲

 Current Forecast is within 0 - 10% above Control Estimate

■

 Current Forecast is greater than 10% above Control Estimate

□

 Comparative Data Not Available

Schedule

●

 Project Completion forecast is On or Ahead of Control Schedule

▲

 Project Completion forecast is 1 to 90 Days Behind Control Schedule

■

 Project Completion forecast is > 90 Days Behind Control Schedule


□

 Comparative Data Not Available

Through these types of reporting systems, MassDOT can monitor the Program's health, comply with legislative reporting requirements in a visible manner, and ensure a high degree of accountability for delivery of the elements of work.


Performance Tracking Indicators have been implemented at the Program level using the Control Measures discussed above, but MassDOT has also developed indicator reports to track the performance within the life-cycle phases.

Below is an example of the report implemented for tracking Construction Phase performance. This report indicates cost and time performance once a construction contract has been initiated using the contractual budget and contractual completion at time of award as the control measure.



Project Performance Indicator Report

(Current Construction vs Original Contract)



Notes

1. Current Forecast data is through November 2, 2010
2. Original Budget: This value is the original encumbrance of funds as detailed on the 681 Request for Encumbrance Form during the contract award process, and typically details the bid price plus other costs (ie owner supplied materials, Railroad costs, artisans, phone/Internet, etc.) that are not included in the bid price but are anticipated to be incurred, as well as traffic control costs (ie police/flagger details) plus contingency. NOTE: For projects original contracted by DCR, it was their practice to only encumber funds equaling the bid price, and any EWOs would require addition encumbrance.
3. Original Contract Completion: The date of completion detailed in the contracts Notice-to-Proceed.
4. Current Forecast - Cost: This value is the construction cost projection for the project based on Original Contract + Executed Change Orders + Pending Change Order Estimates
5. Current Forecast - Schedule: This date is the original contractual substantial completion date + Executed Time Extensions + Pending Time Extension Estimates

				Overall Performance for all Contracted ABP Projects:		Original Budget	Current Forecast Cost	Variance	
						\$525,990,412	\$504,119,300	\$21,871,112	●
Project ID	Project Description	Pre-MassDOT Agency	Contract #	Bid Price	Original Budget/Contract Completion	Current Actual/Forecast	Variance		
605532	DCR- BRIDGE PRESERVATION AT VARIOUS LOCATIONS	DCR	60266	Cost: \$2,144,600 Schedule: 6/30/2009	\$2,144,600 6/30/2009	\$15,000,000 12/31/2010	(\$12,855,400)	549	■
605525	BOSTON- STRUCTURES MAINTENANCE, (B-16-462, B-16-457) STORROW DRIVE WEST BOUND OVER STORROW DRIVE EAST BOUND	DCR	60256	Cost: \$10,283,555 Schedule: 1/21/2009	\$11,492,855 1/21/2009	\$15,250,000 6/19/2009	(\$3,757,145)	149	■
604982	AGAWAM- SPRINGFIELD- BRIDGE PRESERVATION (PAINTING), A-05-001=S-24-005, ROUTE 5 OVER THE CONNECTICUT RIVER	MHD	56365	Cost: \$6,828,600 Schedule: 10/27/2010	\$8,484,590 10/27/2010	\$10,243,300 9/11/2011	(\$1,758,710)	319	■
605531	EVERETT- MEDFORD- STRUCTURE MAINTENANCE, E-12-004=M-12-018, REVERE BEACH PARKWAY (ROUTE 16) OVER THE MALDEN RIVER (WOODS MEMORIAL DRAW BRIDGE)	DCR	60259	Cost: \$2,175,000 Schedule: 6/30/2008	\$2,175,000 6/30/2008	\$3,747,805 12/31/2009	(\$1,572,805)	549	■
605507	BOSTON- CAMBRIDGE- SIDEWALK REPLACEMENT, B-16-007, ROUTE 2 OVER SOLDIERS FIELD ROAD & CHARLES RIVER (BU BRIDGE)	DCR	60257	Cost: \$2,314,950 Schedule: 6/30/2008	\$2,314,950 6/30/2008	\$3,389,144 6/20/2009	(\$1,074,194)	355	■
602570	SPRINGFIELD- BRIDGE BETTERMENT, LONGHILL STREET (NB & SB) AND ROUTE 5 OVER I-91, INCLUDES S-24-049, S-24-050, S-24-051	MHD	56557	Cost: \$3,890,085 Schedule: 11/19/2010	\$4,618,118 11/19/2010	\$5,473,285 8/17/2010	(\$855,167)	-94	■
604683	BOSTON- BRIDGE RECONSTRUCTION, B-16-196, MORRISSEY BOULEVARD OVER MOUNT VERNON STREET (AKA - LECH WALESA BRIDGE) & REHAB OF N-09-003 (AKA PATTEN'S COVE) DCR	DCR	60261	Cost: \$6,238,965 Schedule: 12/22/2010	\$6,238,965 12/22/2010	\$6,620,938 12/22/2010	(\$381,973)	0	●
605509	BOSTON- BRIDGE REPLACEMENT, B-16-365, BOWKER OVERPASS OVER STORROW DRIVE	DCR	60263	Cost: \$5,688,915 Schedule: 10/23/2009	\$5,688,915 10/23/2009	\$6,056,302 6/30/2009	(\$367,387)	-115	▲
605085	MARLBOROUGH- BRIDGE PRESERVATION, M-06-016, I-290 (EB & WB) OVER I-495	MHD	58007	Cost: \$3,547,025 Schedule: 3/28/2011	\$4,258,929 3/28/2011	\$4,596,666 4/15/2011	(\$337,736)	18	▲
605234	DISTRICT 3- SCHEDULED SUBSTRUCTURE REPAIRS & RELATED WORK (AREA A)	MHD	56745	Cost: \$3,065,150 Schedule: 5/25/2010	\$3,498,150 5/25/2010	\$3,633,770 5/25/2010	(\$135,620)	0	■
601393	BROCKTON- BRIDGE REPLACEMENT, B-25-060 (AVA), BARTLETT STREET OVER SALISBURY BROOK	MHD	59675	Cost: \$933,932 Schedule: 3/30/2011	\$1,080,522 3/30/2011	\$1,205,020 3/30/2011	(\$124,498)	0	●
Cost:	● CCCE less than or equal to Original Encumbrance	▲ CCCE less than 10% over Original Encumbrance	■ CCCE more than 10% over Original Encumbrance						
Schedule:	● Current Completion Forecast less than or equal to Original Contract Completion	▲ Current Completion Forecast less than 90 days past Original Contract Completion	■ Current Completion Forecast more than 90 days past Original Contract Completion						

1.A.3 – Proprietary Contract Management Software

MassDOT recognizes that one of the most important and necessary enhancements needed for project controls, is the development and maintenance of computer systems.

During the Summer and Fall of 2009 MassDOT evaluated several proprietary contract management software packages, and whether they should be utilized for the Program. One in particular appeared to have many features that would be beneficial in managing the Program as well as individual projects. However, the evaluation also included cost, training and delay considerations caused by technical

difficulties that come from adoption of new applications. After extensive review, MassDOT determined it would not be feasible or practical to implement a software solution of this type in the short-term. This conclusion was arrived at with the knowledge that over the past several years, MassDOT Design and Construction have been advancing the in-house systems for storing, tracking and reporting on key aspects of project status. These efforts are vital to the success of MassDOT and the new performance management initiatives. Recently, MassDOT senior staff have committed additional/necessary funding to assist with the advancements of these critical systems. The objectives of these advancements are to:

- Provide cost savings through:
 - Reduction in support staff
 - Eliminating redundant data entry points
 - Reducing paper
- Consolidate reporting
- Increase data integrity
- Increase transparency
- Simplify entire business processes
- Enable external user access

The consolidation of this data into a single application also helps satisfy the requirements of Executive Order 510 and simplifies support functions.

With the combined efforts of MassDOT's IT department, Construction staff, Design staff, and Project Controls staff, it is anticipated that enhancements to the systems will be intensified over the next two years. The MassDOT Project Controls Unit (PCU) has been working very closely with the IT Department, including hiring Business Analysts, to help ensure that the scope of the system in development includes many of the beneficial features of the evaluated software solutions. The PCU team is also ensuring that the enhancements incorporate the data elements required to successfully perform project controls including baselining, trending and forecasting.


Additionally, the Project Control Unit produced a "Reporting Assessment", which described some of the shortfalls of the current systems and provided suggestions on topics relating to data management, data validation, data integrity, document control, and reporting consistency, that may need to be incorporated into the system under development.

1.A.4 –Web-Based Reporting

MassDOT has implemented web-based reporting to communicate Program and project status, as well as ensure transparency. The main ABP website contains status reports, updated monthly or quarterly, informative newsletters, news and status updates, as well as information to help answer the many questions from Legislators, community groups, municipalities, and the general public.

[Home](#)
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In the Spotlight



Building Bridges Faster [PDF-621kb]
Learn about the state's first slide-in bridge project. The ABP is replacing a bridge in 8 months.

[September 2010 ABP Quarterly Update](#) [PDF - 1.3 mb]

3 Year Plan Released


- [Bridge Preservation and Repair Plan](#) [PDF - 44kb]
- [Active Project List](#) [PDF - 146kb]

ABP Update

Through September 16, 2010 the MassDOT Accelerated Bridge Program has advertised 111 construction projects with a combined construction budget valued at \$690.1 Million.

Of these 111 advertised construction projects:

- 85 have already, or will, repair/replace 165 site-specific bridges throughout the Commonwealth.
- 26 are maintenance/preservation projects which provide work to improve the safety of additional bridges in the Commonwealth.
- 87 have been awarded to a contractor.
- 28 have been declared 'substantially complete' by MassDOT (or DCR).



Petersham - Routes 32 & 122
(Barre Road) over east branch of Swift River
12.21.2009

Fixing Bridges, Doing Business Differently

The historic \$3 billion Patrick-Murray Accelerated Bridge Program represents a monumental investment in Massachusetts bridges. This program will greatly reduce the number of structurally deficient bridges in the state system, while creating thousands of construction jobs on bridge projects.

To complete this program MassDOT and DCR will rely on the use of innovative and accelerated project development and construction techniques. As a result, projects will be completed on-time, on-budget and with minimum disruption to people and to commerce.

Since 2008, the number of structurally deficient bridges has dropped from 543 to 482, a decline of over 11 percent. The ABP Program has completed 28 bridge projects already, with another 61 bridge projects currently in construction, and an additional 69 bridge projects scheduled to start construction within the next year. Over the course of the eight year program, more than 200 bridges are planned to be replaced or repaired.

[View Accelerated Bridge Program projects on a map.](#)

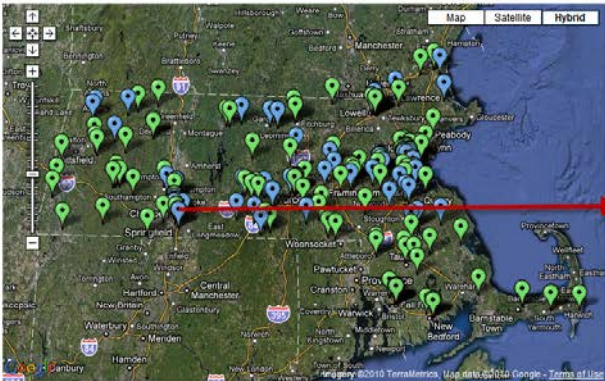
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[Site Policies](#)

The following is a sample of web-based information that is available through the main ABP website. All projects included in the Program are mapped throughout the state, and with a single click, the viewer is able to retrieve information regarding scope, cost, schedule, pictures, and contact information.

Design

Construction







Project #: 603350

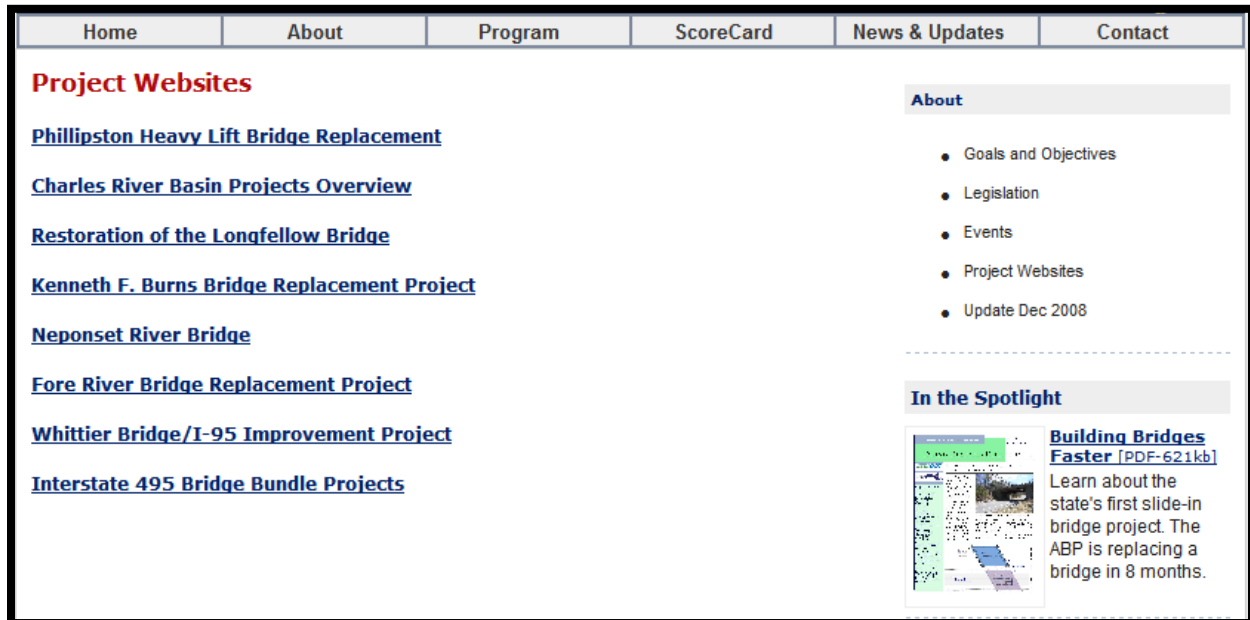
Description: STURBRIDGE- BRIDGE REHABILITATION, 9-30-004, HAYNES STREET OVER THE QUINEBAUG RIVER

Extended Description: The proposed project consists of replacing the superstructure of the Haynes Street bridge over the Quinebaug River. The work will also include the partial reconstruction of piers and abutments, on the same alignment with improvements to the approach roadway.

Contractor Info: Tully Construction Corp. 69 Bruce Lane Southbridge, MA 015502303	Contact: Benjamin F. Tully (President) phone: (508) 754-2222 fax: (508) 754-9162
Advertised Date: 12/12/2009	Bid Open Date: 03/02/2010
Contract Award Date: 04/07/2010	Est. Completion Date: 09/12/2011
Construction Start Date: 04/30/2010	Bid Amount: \$1,856,890.00
Office Estimate: \$2,151,407.00	

Also included on the main ABP website are links to many of the individual project websites for even more detailed information.

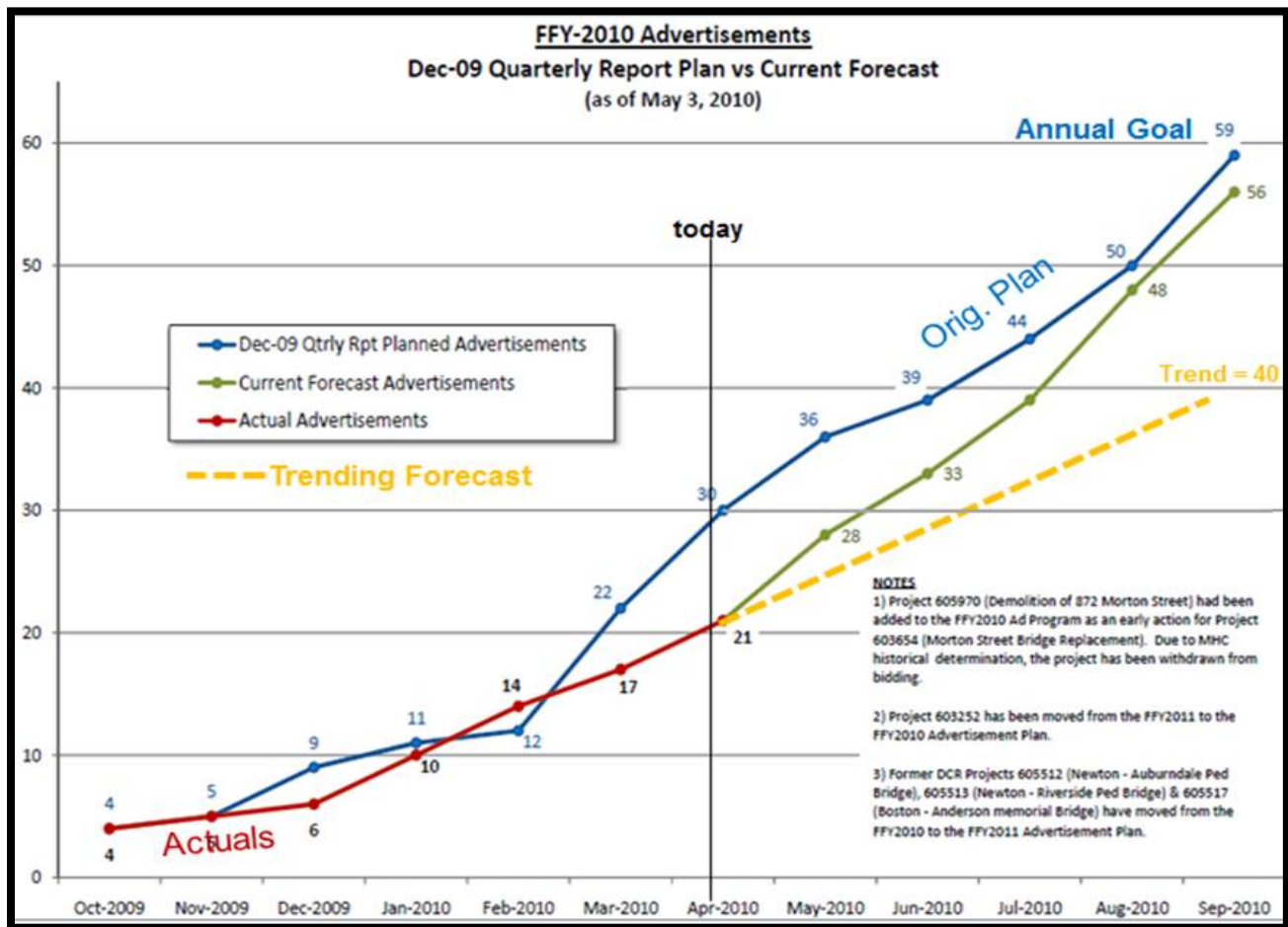


1.A.5 – Program Level Trending

One of the keys to successfully completing the Accelerated Bridge Program is to recognize potential problems before they become issues. Through analysis, trends (both positive and negative) can be determined. By discerning these trends early on in the process, MassDOT can avoid or alleviate probable impacts and can steer events towards successful conclusions.

As part of the Program, MassDOT is monitoring for new and changing risks/opportunities. Areas where trending is evaluated include: cost, schedule and other areas of concern. This is done to determine if program assumptions remain valid, risk levels are changing, policies and procedures are being followed, and will result in contingencies being modified accordingly. This analytical technique is used to monitor and forecast future outcomes based on both historical data and current project results. By using historical data and projecting the possible variance from the baseline (original plan), corrective actions can be taken and impacts can be mitigated.

Below is a sample of a trend analysis used to plan and monitor one of the many important program performance and budget indicators. An annual Advertisement Plan (planned construction procurements) is created by the Design Manager. The graphic indicator below shows the status of the plan as it is measured, communicated, updated and adjusted over time. As that occurs, many important stakeholders, such as Administration and Finance, Oversight Council, Legislators, communities, MassDOT managers, design project managers, designers, Contractors, and many MassDOT departments, are updated with the changes. This is extremely valuable as the results impact many aspects of the program's performance.



1.A.6 – Semi-Annual and Annual Reports to Legislature (C. 233, §6 and §16)

Section 6 of the Accelerated Bridge Program legislation mandates that a report be filed with the Legislature on December 31 of each year that details the annual Structurally Deficient Bridge Improvement Plan. Below is a sample of the report that has been submitted annually to the Legislature. This report depicts the anticipated status of each project at the end of the succeeding year, identifies the bridges to be addressed by each project, and the current status of those bridges. The report also indicates the current cost and schedule information for each project.

Column Header Footnotes:

1 SD STATUS - Bridges that are not structurally deficient (those that are defined as functionally obsolete or not deficient) are included in the Program because cost effective preservation work is being undertaken in order to keep them from declining into structural deficiency.

2 CURRENT CONSTRUCTION COST ESTIMATE - Reflects the most current construction cost estimate, of the predicted bid values, based on the most recent design documents. This estimate includes an allowance estimate for utility relocation, an allowance for incidentals that are specifically needed for the construction contract (police/flaggers), an adjustment for inflation to account for the time period that the work will be installed, and contingency to account for potential/approved growth (controlled by MassDOT). This amount does NOT include costs associated with Design, Right-of-Way, or Project Oversight.

3 CURRENT COMPLETION FORECAST - This date represent the current forecast substantial completion date for the project.

Project Number	Project Description	Bridge Number	BIN Number	SD Status (1)	Current Construction Cost Estimate (2)	Forecast/ Actual Design NTP Date	Forecast/ Actual Advertise Date	Forecast/ Actual Construction NTP Date	Current Completion Forecast (3)
Forecasted to be Substantially Complete by Nov-1-2011					\$198,614,165				
068611	LOWELL- BRIDGE REHABILITATIONS ON ROUTE I-495, L-15-082, CONCORD RIVER, L-15-083, B&M RR & L-15-084, WOBURN STREET	L15082	2JH	Not Deficient	\$35,622,000	4/11/1995	11/22/2008	6/1/2009	7/21/2011
		L15082	2JL	Structurally Deficient					
		L15083	2JK	Not Deficient					
		L15083	2JL	Structurally Deficient					
		L15084	2JM	Not Deficient					
		L15084	2JN	Not Deficient					
601393	BROCKTON- BRIDGE REPLACEMENT, B-25-060 (AVA), BARTLETT STREET OVER SALISBURY BROOK	B25060	454	Structurally Deficient	\$1,205,020	7/11/2008	6/27/2009	10/21/2009	3/30/2011
601447	FALL RIVER- SOMERSET- BRIDGE PAINTING, F-02-058+5-16-008, ROUTE I-195 OVER THE TAUNTON RIVER (BRAGA BRIDGE)	F02058	3TK	Structurally Deficient	\$13,960,305	11/2/2007	6/28/2008	1/5/2009	6/9/2011
602640	WINDSOR- BRIDGE REPLACEMENT, W-41-020, HIGH STREET HILL ROAD OVER WESTFIELD BROOK (AKA- POLLY HARWOOD BRIDGE)	W41020	098	Structurally Deficient	\$655,191	12/9/1998	10/31/2009	3/22/2010	5/1/2011
603244	RANDOLPH- BRIDGE REPLACEMENT, R-01-012, MDC ACCESS ROAD OVER ROUTE 24 (NB & SB)	R01012	36P	Not Deficient	\$4,322,289	11/26/2003	11/8/2008	3/10/2009	11/22/2010
603350	STURBRIDGE- BRIDGE REHABILITATION, S-30-004, HAYNES STREET OVER THE QUINEBAUG RIVER	S30004	1M5	Structurally Deficient	\$1,967,880	8/10/2001	12/12/2009	4/30/2010	9/12/2011
603417	NORWOOD- BRIDGE REPLACEMENT, N-25-003, MORSE STREET OVER THE NEPONSET RIVER	N25003	3JR	Structurally Deficient	\$1,040,746	4/10/2001	8/15/2009	12/11/2009	4/18/2011
603495	PHILLIPSTON- BRIDGE REPLACEMENT, P-09-004, ROUTE 2 OVER ROUTE 2A (STATE ROAD)	P09004	19B	Not Deficient	\$3,198,700	7/11/2008	10/31/2009	4/29/2010	11/30/2010
603975	GARDNER- BRIDGE REPLACEMENT, G-01-023, TRAVERS STREET OVER TRAVERS POND OUTLET	G01023	1FR	Not Deficient	\$1,033,542	7/11/2008	9/26/2009	12/30/2009	7/30/2011
604007	WELLESLEY- BRIDGE REPLACEMENT, W-13-015, CEDAR STREET OVER ROUTE 9 WORCESTER STREET	W13015	2MH	Structurally Deficient	\$3,572,500	4/15/2005	1/16/2010	10/4/2010	8/20/2011
604166	CHESHIRE- BRIDGE REPLACEMENT, C-10-007, HARBOR ROAD OVER HOOSIC RIVER	C10007	03K	Structurally Deficient	\$955,723	3/15/2004	10/31/2009	3/10/2010	5/14/2011
604218	SPRINGFIELD- BRIDGE PRESERVATION, S-24-032, STATE STREET OVER ROOSEVELT AVENUE	S24032	0N7	Functionally Obsolete	\$2,303,300	1/21/2008	11/15/2008	3/30/2009	4/24/2011
604252	SUTTON- BRIDGE RECONSTRUCTION, S-33-013, MAIN STREET OVER THE MUMFORD RIVER	S33013	1YV	Structurally Deficient	\$1,056,363	7/11/2008	6/12/2010	10/12/2010	9/28/2011

Section 16 of the Accelerated Bridge Program legislation mandates that a report that details the progress and expenditures against the Program be filed with the Legislature on June 30 and December 31 of each year. The following is a sample of the report that has been submitted semi-annually to the Legislature. This report includes project life-cycle phase, current cost and schedule information, as well as detailed expenditures against the Program.

				ESTIMATED COST		EXPENDITURES				ESTIMATED SCHEDULE	
				Preliminary Estimate (1)	Current Construction Cost Estimate (2)	Planning & Design Expended Amount (3)	Construction Expended Amount (4)	Other Expended Amount (5)	Total Expended Amount (6)	Original Completion Forecast (7)	Current Completion Forecast (8)
Project Number	Project Description	Project Location	Advert. FFY								
Program Specific					\$0		\$13,622,060	\$6,978	\$42,422,124	\$56,051,161	
DCRI	ABP INTER-AGENCY SERVICE AGREEMENT BETWEEN MASSDOT AND DCR	MULTIPLE				\$210,191	\$0	\$0	\$210,191	ADDED	
POH	PROGRAMWIDE	PROGRAMWIDE			\$0	\$13,411,869	\$6,978	\$42,422,124	\$55,840,970	ADDED	
Not Yet in Design					\$56,594,908	\$85,468,578	\$176,374	\$0	\$40,304	\$216,678	
603531	PEABODY- BRIDGE REPLACEMENT, P-03-013, HOWLEY STREET OVER NORTH RIVER	PEABODY	FFY13	\$1,153,260	\$1,153,260	\$0	\$0	\$5,546	\$5,546	Fall-2013	Fall-2013
604645	SOMERVILLE- BRIDGE REPLACEMENT, S-17-025, ROUTE 28 (McGRATH HIGHWAY) OVER GILMAN STREET (AKA - GILMAN STREET BRIDGE)	SOMERVILLE	FFY12	\$8,810,000	\$8,809,125	\$11,228	\$0	\$3,937	\$15,165	Summer-2012	Fall-2014
604669	WEST STOCKBRIDGE- BRIDGE REPLACEMENT, W-22-004, ROUTE 41 (GREAT BARRINGTON ROAD) OVER WILLIAMS RIVER	WEST STOCKBRIDGE	FFY13		\$1,975,509	\$0	\$0	\$0	\$0	ADDED	Fall-2014
605283	BROOKFIELD- BRIDGE REPLACEMENT, B-26-002, SR 148 (FISKDALE ROAD) OVER THE QUABOAG RIVER	BROOKFIELD	FFY13	\$1,406,264	\$4,737,419	\$10,646	\$0	\$2,853	\$13,499	Fall-2013	Fall-2013
605327	RAYNHAM- BRIDGE DECK REPLACEMENT & PAINTING, R-02-012, SR 24 OVER THE TAUNTON RIVER	RAYNHAM	FFY12	\$5,165,150	\$15,848,797	\$40,242	\$0	\$4,633	\$44,875	Summer-2014	Summer-2014
605344	TAUNTON- BRIDGE REPLACEMENT, T-01-015, WASHINGTON STREET (SR 140) OVER THE MILL RIVER	TAUNTON	FFY12	\$1,273,950	\$4,583,658	\$62,340	\$0	\$4,615	\$66,955	Fall-2012	Winter-2013
605351	WEST BRIDGEWATER- BRIDGE REHABILITATION, W-18-012, SR 106 (WEST CENTER STREET) OVER THE HOCKOMOCK RIVER	WEST BRIDGEWATER	FFY13	\$837,689	\$2,814,988	\$0	\$0	\$926	\$926	Spring-2014	Winter-2014
605353	WEST SPRINGFIELD- SUPERSTRUCTURE REPLACEMENT, W-21-025, SR 147 (WB/EB) (MEMORIAL AVENUE) OVER (US 5) RIVERDALE STREET	WEST SPRINGFIELD	FFY13	\$5,038,595	\$3,725,788	\$50,656	\$0	\$7,385	\$58,041	Fall-2014	Summer-2016
605508	REVERE- SUPERSTRUCTURE REPLACEMENT & SUBSTRUCTURE REPAIRS, R-05-016, REVERE BEACH PARKWAY OVER BLUE LINE AND STATE ROAD	REVERE	FFY12	\$10,000,000	\$9,997,000	\$0	\$0	\$5,137	\$5,137	Summer-2014	Summer-2014
605519	SOMERVILLE- DECK & SUBSTRUCTURE REPAIRS, S-17-039, ROUTE 28 OVER WASHINGTON STREET (MC CARTHY OVERPASS)	SOMERVILLE	FFY13	\$22,910,000	\$22,913,150	\$1,262	\$0	\$5,273	\$6,535	Summer-2013	Summer-2016
605942	BLACKSTONE- BRIDGE REPLACEMENT, B-13-004, ROUTE 122 (MAIN STREET) OVER THE BLACKSTONE RIVER	BLACKSTONE	FFY12		\$3,909,884	\$0	\$0	\$0	\$0	ADDED	Summer-2014
606139	FAIRHAVEN- BRIDGE REHABILITATION, F-01-014, I-195 OVER RIVER AVENUE	FAIRHAVEN	FFY11		\$5,000,000	\$0	\$0	\$0	\$0	ADDED	Fall-2013
In Design					\$1,370,201,116	\$1,606,519,325	\$18,387,223	\$0	\$2,373,593	\$20,760,816	
024090	KINGSTON- BRIDGE REPLACEMENT, K-01-002, ELM STREET OVER THE JONES RIVER	KINGSTON	FFY11	\$1,512,000	\$2,889,643	\$193,021	\$0	\$45,017	\$238,038	Spring-2013	Fall-2012
061301	HAVERHILL- WEST NEWBURY- BRIDGE REHABILITATION, H-12-020=W-20-004, MAIN STREET OVER THE MERRIMACK RIVER (ROCKS VILLAGE BRIDGE)	HAVERHILL - WEST NEWBURY	FFY11	\$6,369,750	\$9,310,846	\$99,362	\$0	\$27,507	\$126,870	Spring-2013	Spring-2014
601096	AMESBURY- NEWBURYPORT- SALISBURY - BRIDGE REPLACEMENTS ON ROUTE I-95, A-07-016=N-11-007, OVER MERRIMACK RIVER (WHITTIER BRIDGE) & A-07-017 OVER EVANS PLACE	AMESBURY - NEWBURYPORT	FFY12	\$285,000,000	\$285,000,000	\$4,967,724	\$0	\$209,294	\$5,177,017	Spring-2016	Winter-2017
601986	ANDOVER- BRIDGE REPLACEMENT, A-09-011, STATE ROUTE 28 (NORTH MAIN STREET) OVER MBTA RR	ANDOVER	FFY12	\$4,986,948	\$5,263,154	\$178,742	\$0	\$16,990	\$195,732	Summer-2012	Fall-2013
602219	SOMERVILLE- BRIDGE REHABILITATION, S-17-005, CROSS STREET OVER THE B&M RAILROAD	SOMERVILLE	FFY12	\$3,781,512	\$2,882,576	\$87,692	\$0	\$1,634	\$89,326	Fall-2013	Summer-2013
602464	FRAMINGHAM- BRIDGE REPLACEMENTS, F-07-003 & F-07-065, WINTER STREET OVER SUDBURY RIVER	FRAMINGHAM	FFY11	\$5,551,577	\$6,707,823	\$105,192	\$0	\$29,772	\$134,965	Spring-2015	Summer-2014

1.A.7 – Program Management Quarterly Report

An extensive two volume report has been developed for quarterly reporting on the Program status. The report content and format has been developed by the MassDOT Project Controls Unit with input from members of the ABP Oversight Council, ABP management, as well as MassDOT management and employees. The production of this report coincides with the quarterly ABP Oversight Council meetings and provides detailed information to the council regarding the status and progress of the Program as a whole.

Topics in the quarterly report include:

Program Goals and Objectives

Identifies the program goals and objectives, so that they are always front and center when discussing the Program.

Schedule Status

Details the status of project life-cycles within the Program including; number of active projects per life-cycle phase; projects in design by their design stage; and schedule trends and variations from that which was previously reported.

Budget Status

Details the status and changes in the Program fund commitments, within the major cost centers.

Expenditures Status

Details the spending plans and actual expenditures by fiscal year.

Program Performance Measures

Describes the control measures and Program performance, in relation to the Program's 90% On-Time/On-Budget goals.

Bridge Conditions

Provides a summary status of former MassHighway and DCR bridge structurally deficiency.

Personnel Status

Details current staffing levels, hiring progress, as well as status of minority and women participation goals within the Program workforce.

Access and Opportunity Status

Details the status of MWDBE participation in the Program, measurement against program goals, as well as job creation and retention status.

Laboratory of Innovation

Each quarter a different topic of innovation being implemented within the Program is highlighted. Topics discussed so far include "heavy-lift" techniques, "NEXT Beam", "folded-plate girders" and "Bridge-in-a-Backpack".

Major Program Exposures

This section describes major areas of concern, where the Program's cost or schedule could be impacted, and also describes the steps being taken to reduce risk. This is one of the most important and thoroughly reviewed sections of the quarterly report.

Charles River Basin Status

This section is a narrative description of the status and progress being made on all the projects in and around the Charles River Basin. The projects include the Craigie Dam & Drawbridge, Longfellow Bridge and BU Bridge. Also discussed are traffic management, as well as pedestrian and bicycle access.

Mega-Projects Status

This section is a summary of each of the mega-projects (those with a value over \$100M) and includes accomplishments to date and the planned activities for the upcoming quarter.

Communications and Outreach Plans

This section details the steps being taken to ensure public participation in the Program.

Volume II – Exhibits

Progress and Expenditures Report	Program Project List Changes
Program Performance Indicator Report	ABP Project Development Report
Current Forecast vs 3-Year Bridge	ABP Project Delivery Report
Preservation and Repair Plan	FFY Advertisements Status Report
Project Performance Indicator Report	Master Schedule Gantt Chart

Budget Reallocation Summary

MassDOT/DCR Interagency Service Agreement Annex

1.A.8 – Weekly and Monthly Status Reports

For a program of the size and complexity of the Accelerated Bridge Program, a vast amount of data is generated. Timely reporting and communication of this data is vital, not only to the program management team, but also to the various stakeholders in the Program. Several weekly and monthly reports are prepared and distributed detailing information to all levels of project involvement.

Below are illustrations of a few examples of weekly ABP communications. The “ABP Advertisements – 30 Day Lookback & 90 Day Lookahead” report details the Program advertising plans and late stage design status.

ABP Advertisements - 30 Day Lookback & 90 Day Lookahead						Information as stored in ProjectInfo System		As of 12/6/2010 7:32:36 AM	
AD Date	Project No	Project Description	Design District Resp	ROW Cert Issued	ENV Section Cleared	PS&E Received	PS&E to CEPO	Office Estimate	
12/4/2010	605465	DISTRICT 2- INTERSTATE DECK REPAIRS AT VARIOUS LOCATIONS (ABP-PR19)	2	No	No	11/17/2010	12/1/2010	\$0.00	
Project Manager: Kyriazidis, Hercules 617-973-8210 Hercules.Kyriazidis@state.ma.us									
12/4/2010	605467	DISTRICT 2- INTERSTATE SUBSTRUCTURE REPAIRS AT VARIOUS LOCATIONS (ABP-PR20)	2	No	Yes	11/15/2010	12/1/2010	\$0.00	
Project Manager: Kyriazidis, Hercules 617-973-8210 Hercules.Kyriazidis@state.ma.us									
12/18/2010	603252	TAUNTON- SUPERSTRUCTURE REPLACEMENT, T-01-051, HOLLOWAY STREET OVER ROUTE 140 N.B.	5	N/A	Yes			\$2,680,800.00	
Project Manager: Soma, Stephen 617-973-8176 Stephen.Soma@state.ma.us									
12/18/2010	603654	BOSTON- BRIDGE REPLACEMENT, B-16-163, MORTON STREET OVER THE MBTA & CSX RAILROAD	4	Yes	Yes	9/28/2010		\$7,447,108.50	
Project Manager: Hopkinson, Matt 617-973-8193 Matt.Hopkinson@state.ma.us									
12/18/2010	603701	DALTON- BRIDGE REPLACEMENT, D-01-012, CLEVELAND ROAD OVER WAHCONAH FALLS BROOK	1	No	Yes	9/3/2010		\$1,409,510.00	
Project Manager: Brown Jr, William 617-973-7568 William.BrownJr@state.ma.us									
12/18/2010	606263	DISTRICT 3- TREE TRIMMING & SITE DISTANCE CLEARING FOR UTILITY RELOCATIONS	3	No	No			\$0.00	
Project Manager: Rush, Richard 617-973-8412 Richard.Rush@state.ma.us									
12/25/2010	605470	CHICOPEE - I-90 OVER I-391 - BRIDGE PRESERVATION #C-13-043 (ABP-NFA7)	2	No	Yes			\$0.00	
Project Manager: Kyriazidis, Hercules 617-973-8210 Hercules.Kyriazidis@state.ma.us									
12/25/2010	605472	DISTRICT 2- SCHEDULED AND EMERGENCY REPAIRS AT VARIOUS LOCATIONS (ABP-PR21)	2	No	No			\$0.00	
Project Manager: Kyriazidis, Hercules 617-973-8210 Hercules.Kyriazidis@state.ma.us									
1/29/2011	604032	DUDLEY- BRIDGE REPLACEMENT, D-12-010, WEST DUDLEY ROAD OVER THE QUINEBAUG RIVER	3	No	No	10/25/2010		\$5,558,319.00	
Project Manager: Tayarani, Morteza 617-973-7583 Morteza.Tayarani@state.ma.us									
2/12/2011	604046	FITCHBURG- BRIDGE REPLACEMENT, F-04-007, ROUTE 2A (KIMBALL STREET) OVER THE NASHUA RIVER	3	No	No	5/14/2010		\$3,538,421.00	
Project Manager: Tayarani, Morteza 617-973-7583 Morteza.Tayarani@state.ma.us									
2/12/2011	605088	FITCHBURG- BRIDGE BETTERMENT, F-04-008, RIVER STREET (ST ROUTE 31) OVER NORTH NASHUA RIVER	3	No	No			\$1,997,305.00	
Project Manager: Tayarani, Morteza 617-973-7583 Morteza.Tayarani@state.ma.us									
3/5/2011	603180	CHICOPEE- BRIDGE REPLACEMENT, C-13-008, ROUTE 116 (SPRINGFIELD STREET) OVER THE CHICOPEE RIVER (AKA - DAVITT MEMORIAL BRIDGE) & BRIDGE REHABILITATION, C-13-007, ROUTE 116 (SPRINGFIELD STREET) OVER DWIGHT MFG. CANAL	2	No	No			\$9,223,000.00	
Project Manager: Dalton, James 617-973-7579 James.Dalton@EOT.state.ma.us									
AD Date = Advertisement has occurred in the past 30 days									

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Also the “ABP Major Project Design/ROW/Environmental Events – Past 30 days” report communicates the recent events in the design phase of the project life-cycle.

ABP Major Project Design/ROW/Environmental Events - Past 30 days						Information as stored in ProjectInfo System	
Project	Event Group	Event Category	Event Description	Event Date	Event Remarks	Site Specific?	Current Scheduled Advertise
District 1							
603646	WORTHINGTON- BRIDGE REPLACEMENT, W-45-006, ROUTE 112 OVER KEARNEY BROOK					<input checked="" type="checkbox"/>	4/30/2011
	Design	75% Design	75% Comments to DE	11/29/10	Received District written comments and emailed them to design consultant. Gave hard copies of marked up plans to design consultant on 12/2/10.		
	Right of Way Design	Advanced Title Exam	Completed	11/29/10	4 TITLES		
	Design	75% Design	75% Comments to DE	11/19/10	Received Traffic review comments (dated 11/16/10) and emailed them to design consultant.		
	Right of Way Design	Plans	Accepted	11/15/10	REVISED ACCEPTED		
	Design	75% Design	75% Comments to DE	11/15/10	Received Pavement review comments (dated 11/12/10) and emailed them to design consultant.		
	Environmental Design	Project Review	75% Design Approved	11/08/10			
	Design	75% Design	75% Comments to DE	11/08/10	Received Environmental review comments and emailed them to design consultant.		
603701	DALTON- BRIDGE REPLACEMENT, D-01-012, CLEVELAND ROAD OVER WAHCONAH FALLS BROOK					<input checked="" type="checkbox"/>	12/18/2010
	Right of Way	Registry Plans/Instruments	Accepted	11/09/10	MYLARS RECEIVED		
604005	CONWAY- BRIDGE REPLACEMENT, C-20-003, NORTH POLAND ROAD OVER POLAND BROOK					<input checked="" type="checkbox"/>	7/30/2011
	Environmental	Section 404 (ACOE)	Permit Issued	11/24/10	Comprehensive Bridge Permit (RHB)		
District 2							
605084	BARRE- BRIDGE REPLACEMENT, B-02-005, ROUTE 122 OVER PRINCE RIVER					<input checked="" type="checkbox"/>	7/2/2011
	Environmental	Section 404 (ACOE)	Permit Issued	11/17/10	CPB Complete (RHB)		
605465	DISTRICT 2- INTERSTATE DECK REPAIRS (ABP-PR19)					<input type="checkbox"/>	12/4/2010
	Design	Final Design	PS&E to CEPO	12/01/10			
	Design	Final Design	PS&E Received	11/17/10			
605467	DISTRICT 2- INTERSTATE SUBSTRUCTURE REPAIRS (ABP-PR20)					<input type="checkbox"/>	12/4/2010
	Design	Final Design	PS&E to CEPO	12/01/10			
	Design	Final Design	PS&E Received	11/15/10			
District 3							
602464	FRAMINGHAM- BRIDGE REPLACEMENTS, F-07-003 & F-07-065, WINTER STREET OVER SUDBURY RIVER					<input checked="" type="checkbox"/>	7/9/2011
	Design	25% Design	Design Public Hearing	11/18/10			
	Design	25% Design	25% Comments to DE	11/15/10	Revised 25% to DE		
	Environmental	Project Review	25% Design Approved	11/08/10			
604046	FITCHBURG- BRIDGE REPLACEMENT, F-04-007, ROUTE 2A (KIMBALL STREET) OVER THE NASHUA RIVER					<input checked="" type="checkbox"/>	2/12/2011
	Environmental	Section 401 (WQC)	Permit Issued	11/22/10	401 WQC-SF issued (AJM)		
604161	NORTHBRIDGE- BRIDGE REPLACEMENT, N-21-004, DOUGLAS ROAD OVER THE MUMFORD RIVER					<input checked="" type="checkbox"/>	6/4/2011
	Environmental	Project Review	25% Design Approved	11/16/10	(MJB)		
	Design	25% Design	25% Comments to DE	11/10/10	Revised 25% to DE		
604690	WORCESTER- BRIDGE REHABILITATION/REPLACEMENT, W-44-010, (STATE ROUTE 12) WEBSTER STREET OVER MIDDLE RIVER					<input checked="" type="checkbox"/>	8/6/2011
	Design	25% Design	25% Comments to DE	11/30/10	Need to resolve utility issues first before holding a Public Hearing Received Revised 25% HW plans		
						Project has been Advertised: <input type="checkbox"/>	

Additionally, the procurement personnel produce a report each week, detailing the progress of ABP projects from Advertisement through Notice-to-Proceed. This information is invaluable to the District construction personnel in preparing for the upcoming construction season.

ProjectID	Contract No	District	City	Adv. Date	OfficeEst	Bid Opened	BidAmt	Award Date	NTFDate	Encumbrance	Project Description	Contractor	Address
603713	66090	6	DOVER-NEEHAM	7/24/2010	\$3,636,379.10	9/21/2010	\$2,864,546.00	10/27/2010	11/16/2010	\$3,356,787.00	Bridge Replacement (D-10-004-N-04-007) (Concrete) - Willow Street over the Charles River. (ABP)	Giosso & Sons, Inc., P.	50 Sprague Street, Hyde Park, MA
603725	66461	4	LOWELL	7/24/2010	\$9,446,016.00	10/13/2010	\$6,963,321.25	11/17/2010		\$0.00	Bridge Replacement (L-15-072) (Steel) - Lowell Connector (EB and WB) over Plain Street. (ABP)	SPS New England, Inc.	98 Elm Street, Salisbury, MA
600776	66336	6	WELLESLEY	7/24/2010	\$1,792,213.00	10/5/2010	\$1,627,682.00	11/24/2010		\$0.00	Bridge Replacement (W-13-007) (Concrete) - Rockland Street over the MBTA and CSX Railroads. (ABP)	Northern Construction Service, LLC	775 Pleasant Street, Unit 11, Weymouth, MA
604788	66466	3	UXBRIDGE	7/24/2010	\$2,076,711.00	10/13/2010	\$1,563,739.60	11/24/2010		\$0.00	Bridge Replacement (U-02-030) (Steel) - River Road over Ironstone Brook. (ABP)	Racchio Corporation, John	20 Lark Industrial Parkway, Smithfield, RI
605473	66564	2	SPRINGFIELD	7/24/2010	\$1,694,934.00	10/19/2010	\$1,269,702.50	11/17/2010		\$0.00	Scheduled and Emergency Deck and Joint Repairs (Including Painting) on Two Bridges (S-24-017 and S-24-071) (Steel) - St. James Avenue over I-291 and the CSX Railroad. (ABP)	SPS New England, Inc.	98 Elm Street, Salisbury, MA
601667	66563	3	MILLIS	7/31/2010	\$4,006,870.00	10/19/2010	\$2,433,655.10	11/24/2010		\$0.00	Bridge Replacement (M-23-006) (Concrete) - Pleasant Street over the Charles River. (ABP)	MAS Building & Bridge, Inc.	842 Upper Union Street, Unit 8, Franklin, MA
604051	66665	1	COLBAIN	8/7/2010	\$972,552.25	10/26/2010	\$746,562.00	11/24/2010		\$0.00	Bridge Replacement (C-18-023) (Concrete) - Route 112 (Griswoldville Road) over Griswoldville Canal. (ABP)	E. T. & L. Corp	873 Great Road, P. O. Box 295, Stow, MA
604514	66843	3	UXBRIDGE	8/21/2010	\$1,103,915.00	11/9/2010	\$2,567,725.85			\$0.00	Bridge Replacement (U-02-001) (Steel) - Route 122 (Main Street) over the Blackstone River. (ABP)	Racchio Corporation, John	20 Lark Industrial Parkway, Smithfield, RI
605272	66755	5	BARNSTABLE	8/21/2010	\$2,608,724.00	11/2/2010	\$2,144,777.77	11/17/2010	11/18/2010	\$2,727,434.00	Bridge Rehabilitation (Including Painting) (B-01-019) (Steel) - Route 6 over Iyanough Road (Route 132). (ABP)	Aetha Bridge Company	30 Lockbridge Street, Pawtucket, RI
604912	66834	2	ATHOL	8/21/2010	\$5,061,574.00	11/16/2010	\$3,427,489.20			\$0.00	2 Bridge Superstructure Replacements (S-15-033, A-15-034) (Steel) - Route 2 over South Athol and White Pond Roads. (ABP)	MIG Corporation, Inc.	One Acton Place, Suite 200, Acton, MA
601322		2	SOUTHWICK	8/29/2010	\$2,728,000.00	12/7/2010				\$0.00	Bridge Replacement (S-22-005) (Concrete) - Route 202 / Route 10 over Johnson Brook. (ABP)		
606186		6	BRAINTREE-RANDOLPH	9/4/2010	\$1,494,000.00	12/21/2010				\$0.00	Cleaning, Painting and Structural Repairs to 3 Bridges (B-21-029, B-21-030 & R-01-001) at Various Locations. (ABP)		
606187		6	MILTON	9/4/2010	\$1,212,000.00					\$0.00	Painting and Structural Repairs to 2 Bridges (M-25-019 & M-25-020) over Interstate 93. (ABP)		

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Monthly reports are also produced, by the District personnel, detailing construction status including progress, change orders issued and pending, as well as Pay Item overruns and underruns.

Report Number: 2010-25

Project No.: 601393
Contract No.: 59675
Federal Aid #: NFA
Resident Engineer: Ken Belgrave CE III

Scope: Replacing the existing superstructure and partial substructure demolition of Bridge No. D-25-60 (Concrete), Bartlett St. over Salisbury Brook.

Project Status
Bid Amount \$ 933,932.44 (Funds Enc. \$1,080,622.00)
Funds Expended to Date \$ 932,280.43 (Est. 17)
Percent complete 99.5% Ahead Schedule 0% Behind Schedule 22% Orig. Completion Date 03/10/2011
Extension Pending (Y/N) N Date Requested Extended Completion Date
Current Operations: (Briefly explain ongoing activities)
Texas Bridge Rail and endpoints complete. Bit Conc binder has been placed on approaches and bridge deck. Casting adjustments, granite curb and bit conc. sidewalk ongoing.
Future Operations: (Briefly explain two week look ahead schedule)
Guardrail, final paving, and traffic markings. If weather allows bridge opening is anticipated this construction season.

Issues and Actions: Schedule Impacts

Explain Issues	Explain Resolution
1 Proposed drainage designed on top of existing sewer	1 Consultant has provided redesign of drainage
2 Contractor requested direction concerning relocated water main and approach slab	2 Consultant has provided design. City of Brockton has approved
3 Revised environmental permits	3 Submitted to Army Corp and DEP. Approved
4 Contractor revising sewer bypass, including retraining existing sewer pipes.	4 Site meeting with City of Brockton, 05/24/2010, to discuss possibility of retaining existing sewer main. EWO proposal submitted. City of Brockton informed some financial participation will be required. City of Brockton reviewing. Rejected
5 Contractor submitting price, to be funded by City of Brockton, extending sewer replacement to project limits.	5 City of Brockton has agreed. MassDOT has written a non-participating EWO.
6 Due to sewer issues, Contractor has fallen substantially behind schedule.	6 Contractor preparing accelerated schedule of operations, which will include acceleration costs. Due to high estimated

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cost, \$ 307,985.96, this proposal has been rejected. Contractor will prepare and submit request for extension of time.	7 Pending. % complete based on existing schedule of operations.
7 Contractor's revised schedule of operations and request for extension of time under review. Contractor's original schedule shows deck placement, approach slabs and sidewalks to be completed Spring 2011. This work was completed Fall 2010.	8
8	9

Issues and Actions: Budget Impacts

Explain Issues	Explain Resolution
1	1
2	2
3	3
4	4
5	5
6	6

CSD-683 Resident Engineers Report of Change-Extra Work Orders

683#	EW O#	Item Description	Date Submitted	Date Approval	Cost
1	1	Revised drainage plan (force account)	04/09/2010	06/02/2010	2,524.06
2	2	Extended sewer bypass	05/28/2010	06/30/2010	68,985.34
3	101	Non-participating EWO for extension of sewer to project limits. (City funded, not included in total)	06/29/2010		133,214.38
6	1.1	Revised drainage plan (force account)	09/27/2010		2,856.85
7	102	Non-participating EWO for drainage related to sewer conflict. (City funded, not included in total)	10/08/2010		12,238.25
Total to Date					104,566.25

CSD-683 Resident Engineers Report of Change-Overruns/Underruns

683#	Item#	Description	Overrun	Underrun	Date Submitted	Date Approved	Cost
3	853.2	Temp. Conc. Barrier	X		06/28/2010	06/28/2010	9,780.00
4	657.	Temp. Fence	X		06/28/2010	06/28/2010	2,450.00

All of these reporting structures have been developed with one goal in mind: communication. An informed staff is a productive and efficient staff. MassDOT continues to strive toward better and more concise reporting of status, trending and forecasting, to ensure a solid foundation on which to control

and manage the Program. This provides flexibility to react to changing elements in an efficient and timely manner.

1.B – PROGRAM COST & SCHEDULE CONTROL PERFORMANCE

1.B.0 – Summary

Chapter 233 of the Acts of 2008 requires that MassDOT track the Program's on-time and on-budget results against a performance goal. In the course of the past sixteen months, MassDOT has implemented significant improvements to program reporting and, with the introduction of the Acts of 2009, performance management is currently being implemented throughout MassDOT. The following sections provide an update of the Program Cost and Schedule Control elements.

1.B.1 – Program Cost & Schedule Control and Performance Tracking Indicators

The Quarterly Council Report, as referenced in section 1.A.7, provides MassDOT senior managers, and the Oversight Council with many significant performance tracking indicators. Three of these performance measures, often referred to as the 'On-Time/On-Budget Scorecards'. These are very important aspects of the Program's ability to manage and measure success; routinely report on cost and schedule progress; analyze possible recovery efforts/corrective action; and to assist in the prioritization of MassDOT's focused improvement.

The ABP Program has been developed with a procedure that promotes accountability at the contract level, and transparency/visibility at the Program Management level.

These Performance Indicators are utilized to:

- ensure transparency in reporting project/contract level problems;
- provide a system of accountability at the project/contract level;
- ensure that program level decisions are based on all critical contract level considerations;
- develop an efficient mechanism to summarize and report on the overall ABP program health; and
- provide the ability to create multiple levels of reporting for ABP projects within the larger program.

The three performance 'scorecards' are:

- the Program Performance Indicator (Program PI) Report
- the Project Performance Indicator (Project PI) Report
- the Current Forecast vs Original 30-Nov-2008 3 Year Bridge Plan Report

Each of these reports serves a unique purpose in the Program reporting, tracking schedule and cost indicators.

Program Performance Indicator Scorecard

The Program Performance Indicator Report sets a project baseline (initial cost and schedule assessment), ideally based on the 75% design documents, well before the project bids but also at a stage that is advanced enough to properly assess the anticipated construction schedule and cost. This allows

the Designers, the Design Project Managers, and members of the Construction teams to all work on minimizing cost and schedule growth throughout the project development and through the delivery phases. This scorecard will be used to report against the Program-level 90% on-time/on-budget performance goal.

Project Performance Indicator Scorecard

Subsequent to the initial assessment, a more detailed construction schedule and cost estimate, utilizing the most recent contract documents, is developed. These detailed assessments are used to determine reasonable construction contract durations and costs, which the prospective bidders will use to prepare their pricing. Once approved by MassDOT, a Contract Time Determination (CTD) schedule is the basis of the contractual completion milestones. During the construction phase, the performance of the Contractors, MassDOT Construction group, and MassDOT Design group are collectively measured against this scorecard. This scorecard will be used to report against the project-level 90% on-time/on-budget performance goal.

Original Forecast Scorecard

Finally, to also comply with the legislative requirements, the “Current Forecast vs. Original 30-Nov-2008 Three Year Bridge Plan” is utilized. This is a measure of the project cost and schedule performance, since the beginning of the Program, for a select grouping of projects (87) that were originally forecasted to be completed by the autumn of 2011.

It should be noted, that due to the conceptual information that was used to generate the 30-Nov-2008 Three Year Bridge Plan, the ABP management has decided to emphasize the importance of the utilization of the Project Performance Indicator, and the Program Performance Indicator reports (vs utilizing the November 2008 list as a baseline of performance). As a result, MassDOT resources can be better channeled to achieve more realistic goals as identified in the December 2008 Project Controls Report.

1.B.2 – Formalized Cost Containment Program

MassDOT has been actively implementing innovative bridge construction. The decision to implement a formalized cost containment program will be evaluated, in the future, as MassDOT develops an update of many of the Standard Operating Procedures (SOP).

1.B.3 – Peer Reviews

MassDOT has evaluated their development and delivery process to streamline the review, approval and execution of projects. MassDOT has modified business processes to address the following objectives:

- Evaluate other potential options that may be cost-effective or may improve the completion of a bridge contract – *Implemented Decision-making matrix, VE studies, risk assessments, and constructability reviews.*
- Supplement MassDOT’s management staff to provide additional technical support and resources – *Hired a Director of Project Development, Director of Project Delivery, and Project Controls Manager.*

- Provide an additional level of review on critical projects beyond the existing Program management – *Incorporated VE studies, technical reviews (by outside consultants), independent cost estimates, independent schedule reviews, and claims avoidance reviews.*

Specific improvements planned or in process:

- Perform an independent review of the current project scope, budget and schedule vs. compliance with the originally planned scope, budget and schedule – *PCU team performs this function.*
- Evaluate the existing contractual obligations and the extent to which Contractor and MassDOT have met those obligations – *The PCU field cost/schedule analysts assist in reviewing the Contractor schedule submittals and change order proposals. The MassDOT Resident Engineers ensure the Contractors meet their contractual obligations. The Project Controls team monitors projected costs and reports significant variances from plan.*
- Identify any gaps in responsibilities between the project team members and/or any disconnects between MassDOT expectations and each team members' contracted scope. – *MassDOT has reviewed the business processes and the role of the individual team members to ensure a comprehensive oversight of the Program.*
- Evaluate the current budget and the general budget trend/exposure for the completion of the Program – *The PCU, working with Program Management and MassDOT Finance; closely monitor the Program budget on a quarterly basis.*
- Perform an exposure assessment of current major open issues (values exceeding \$250,000) and recommend potential courses of action - *The PCU, working with Program Management and MassDOT Finance, closely monitor Program exposures on a quarterly basis.*
- Identify systematic or organizational issues and opportunities to improve performance – *MassDOT has prepared a new operating plan which is performance management driven.*
- Evaluate current Schedule Construction Controls Program and make recommendations for potential revisions as warranted, including identifying any specific deficiencies or concerns – *New schedule specifications have been implemented, schedule training for MassDOT personnel has commenced, new schedule positions will be posted, and the drafting of a new Resident Engineer's Manual has been initiated.*
- Identify apparent major schedule risks – identify specifics in the schedule and provide recommendations for mitigation – *The PCU and/or Resident Engineers continuously monitor and report on status of project schedules and identify areas of concern.*
- Evaluate remaining top critical paths and provide an adequate measuring tool for the Contractor's accountability and evaluation of feasibility of the remaining schedule– *The PCU and/or Resident Engineers continuously monitor and report on status of project schedules and identify areas of concern.*
- Briefly evaluate sub-critical paths and provide any observations or recommendations to evaluate further– *The PCU and/or Resident Engineers continuously monitor and report on status of project schedules and identify areas of concern.*
- Briefly evaluate any potential schedule recovery steps that should be evaluated further by the Contractor– *The PCU and/or Resident Engineers continuously monitor and report on status of project schedules and identify areas of concern.*

As part of the above process, the following selected documents are reviewed by MassDOT:

- Designer Contracts
- Contractor Contracts

- Base-Bid Construction Documents (Plans and Specs)
- Current version of Plans and Specs
- Contract Budget (Original and Current)
- All significant change orders
- Project Schedules (baseline and all applicable updates)
- All Schedule extensions and revisions to the baseline schedule
- Current and past payment requisitions
- All major pending Claims/Disputed issues (Over \$250,000)
- Quantity takeoffs and estimates generated by others

MassDOT has also been utilizing technical Peer Reviews, to perform a quality control check of the contract bid documents.

The main objectives of these technical Peer Reviews is to:

- Evaluate potential errors or inconsistencies in the bid documents – in advance of bidding.
- Have independent Design Consultants provide this technical support as an additional level of independent review beyond the existing Program management.

As comments are generated by the Peer Reviewer, the MassDOT Design Project Manager is tasked with a review and disposition of comments. Often times, the Designer of Record makes changes to the bid documents as a result of these comments. These reviews have been extremely helpful in generating comments that improve the quality of the bid documents. Although it is difficult to quantify the actual cost saving on initiatives like this, MassDOT sees the value of continuing these reviews in the future.

Although this design stage peer review concept is primarily focused on the quality of the design documents, additional design phase reviews from: the Bridge Group (internal MassDOT), the District Utility Constructability Engineer (DUCE), the Contracts Groups, and in some cases, a Claims Avoidance Reviewer (from the Project Controls Unit) have also been performed. Due to the extensive amount of reviews that are currently being performed, MassDOT, with the assistance of the Project Controls Unit, has plans to evaluate the scope and potential duplication of these reviews and is expected to make a refinement within the next few months.

1.B.4– Supplemental Program Management Oversight Advisor (PMOA)

At this point in the ABP Program, MassDOT has no plans to implement a formal PMOA. It has been determined that the Project Controls Unit, along with the Oversight Council, the Chief Engineer, the Finance & Accounting groups, and the Legal Department have been providing a sufficient level of scrutiny. Should additional oversight be deemed necessary, a PMOA can be implemented to do a review/audit.

1.B.5 – Early Risk Task Force

MassDOT is utilizing Value Engineering Studies and Risk Management Assessments, on the five “mega-projects” and one of the newly added projects, the I-93 bridge superstructure replacements in Medford. See 1.B.8 and 1.B.9 for summary. At this time, MassDOT does not plan to implement any additional early risk task force.

1.B.6 – Program Overhead Control

Significant efforts have been implemented to keep the MassDOT overhead costs minimized. The original Program overhead budget, approximately \$390 million, has already been reduced to \$212 million. Much of this reduction has been done with the utilization of staffing projections prepared, and routinely evaluated, by the ABP Program Manager and MassDOT's Chief Financial Officer.

With the introduction of the Acts of 2009, performance management initiatives will be helpful in evaluating appropriate staffing levels, one of the key overhead concerns. It is expected that many new procedures will be implemented, and that they are necessary to significantly improve the management and documentation of all of MassDOT projects. As these new requirements are instituted, the newly established MassDOT Office of Performance Management, along with the ABP Project Controls Unit, will evaluate the ability to carry out these new functions. Shortly after the RE Manual is developed, a Field Management Ratio analysis will be performed by first evaluating past historical data to determine an optimal field management staff ratio (people/\$ of bridge contract – by major cost category). Later, an evaluation of the new Resident Engineer requirements will be performed to see how many hours a typical project will take to manage on a monthly basis. As the results are compiled, MassDOT management will be given the tools that they need to make informed decisions and adjustments.

Other 'Overhead' Costs

The MassDOT Finance group, working with the ABP Managers, evaluates the budget of non-construction costs, on a quarterly basis.

1.B.7 – Internal Program Control Meetings

As part of MassDOT's management, regular weekly/internal Senior Project Management Control Meetings are routinely held. These meetings will continue to be implemented for the ABP duration.

The main objective of these meetings has been to:

- create and maintain the accountability and transparency required for the legislative reporting requirements;
- generate a formalized senior management review process that allows for program level priorities to be evaluated, and acted on, as efficiently as possible; and
- identify specific schedule and cost control priorities to be addressed in further detail in the other Design Manager/Construction Manager review meetings (see section 2.C).

1.B.8 – Value Engineering Studies

Background and Regulations

The 1970 Federal-Aid Highway Act, authorized the U.S. Secretary of Transportation to require value engineering on proposed federal-aid highway projects. The National Highway Systems Designation Act of 1995 extended this by including a provision requiring the U.S. Secretary of Transportation to *"establish a program to require states to carry out a value engineering analysis for all projects on the National Highway System with an estimated total cost of \$25 million or more."* ("Total Cost" includes

Design, ROW, Mitigation, Construction, Administrative, etc.) The FHWA published regulation 23 CFR Part 627 establishing this program in 1997, to comply with these requirements.

The “Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users” (SAFETEA-LU) of 2005 expanded the role of value engineering on the Federal-Aid system. In addition to requiring a value engineering analysis for all projects on the Federal-aid system with an estimated total cost of \$25 million or more, it included a provision requiring a value engineering analysis on bridge projects with an estimated total cost of \$20 million or more.

This Act also clarifies that:

“Any State choosing to use an innovative **Design/Build** concept to expedite the completion of an applicable NHS project must still comply with the requirement to perform a VE analysis on the project. In most cases, the VE analysis should be performed prior to awarding the design/build contract.”

Value Engineering is:

The systematic application of recognized techniques by a multi-disciplined team that: identifies the function of a product or service; establishes a worth for that function; generates alternatives through the use of creative thinking; and provides the needed functions to accomplish the original intent of the project, reliably and at the lowest life-cycle cost without sacrificing project requirements for safety, quality, operations, maintenance, and environment.

The successful administration of the VE program can contribute measurable benefits to the quality of the surface transportation improvement projects and to the effective delivery of the overall Accelerated Bridge Program.

VE studies are required to be conducted in accordance with the methodology as prescribed by AASHTO VE Guidelines and SAVE International. Each study has three distinct parts and typically takes 5 to 8 weeks to complete:

- **Pre-Study Activities** – Information gathering, team selection, develop cost model, finalize logistics and Agenda, review all project documents, conduct site visit, coordinate with the designer to present a project overview to the VE team.
- **VE Study** – Typically a 5-day workshop, with an independent technical team representing all technical discipline necessary to analyze the project. The workshop is concluded on the fifth day by a final presentation to MassDOT, FHWA and original designer.
- **Post-Study Activities** – Issue Preliminary report, conduct Implementation meeting to determine the disposition of the ideas, and issue Final report.

Currently, six of the ABP’s most costly projects have had a Value Engineering analysis performed. Additionally, VE studies were performed on two projects prior to the ABP program.

1.B.9 – Forecasting Risk & Exposures

The ABP Projects that have the most significant cost estimates will be implemented with a risk management assessment, after the projects have developed past the 25% Design stage. It is anticipated that the Burns Memorial Bridge and the Fore River bridge projects will receive a Risk

Management Assessment in the spring of 2011, followed by the Whittier and the Longfellow bridge projects in the summer of 2011.

Additionally, the other significant Program exposure, the traffic in the Charles River basin (a heavily populated area with over 6 ABP bridges in close proximity), has been identified to include a form of risk management in the project development stage. A risk management Consultant, independent of the Project Controls Unit, has completed and submitted an Existing Conditions and Model Development Methodology memorandum for the travel demand model, as well as the Existing Origin-Destination Review and Construction Sequencing Evaluation memorandum. Both memorandums are being used to coordinate design and construction projects, and will be posted to the new Charles River Basin ABP website for public review. Over the course of the ABP Program, the Construction Sequencing Evaluation will be updated as projects hit major milestones in design and construction.

1.B.10 – Designer/Engineer Accountability Program

As many of the existing Design contracts have been amended to include scope to develop more detailed/useful design schedules, more robust construction cost estimates, better planning of the construction sequence/constructability, and contract time determination studies, a very important performance report has been concurrently implemented within the Highway Division. This Designer Evaluation report has been updated to include many important aspects of what MassDOT expects of their designers. Notably, there is a section on project controls that allows MassDOT to evaluate/score the Designer's performance with regard to the cost/claims avoidance and schedule aspects of the projects. This is expected to be an important part of the necessary performance management initiatives in the years to come. The Designer's ability to work with MassDOT in the future work will be predicated on this evaluation.

1.B.11 - Escalation Costs & Unallocated Contingency

In order to maintain cost control and fulfill public commitments, MassDOT has provided a clear budget allocation of project costs, escalation and contingencies, at both a contract and a program level.

It is important to note that the proposed definition of "on-time/on-budget," for the purposes of the legislative reporting, includes a reasonable amount of escalation and contingencies in each construction contract, and in the overall Program Budget (*see Section 1.A.2, Performance Tracking*).

Since the ABP was initiated, a number of the nation's DOT's have seen a considerable drop in Contractor bids/pricing, Massachusetts included. A study performed by the Project Controls Unit, as presented to the Oversight Council and the MassDOT Board, was used to make an important Program budget adjustment. The paragraphs that follow describe the project controls adjustments, which were generated from the analysis.

Prior to September of 2010, the ABP had maintained a healthy unallocated contingency budget of \$137M, in anticipation of **potential** cost growth. The following cost centers had been identified to assess risk and budget the unallocated contingency:

- a. high bids that exceed the current budget (office estimate)

- b. project costs that exceed encumbered values
- c. incentive costs (for projects that do not have incentive budgets already specifically identified)
- d. public outreach and mobility costs
- e. emergency repairs
- f. design consultant contract growth
- g. litigation support
- h. risk management
- i. excessive material or labor escalations

In September of 2010, significant additions to the Program and modifications to individual project budgets yielded a considerable reduction, to \$11M, in the unallocated contingency budget. Based upon the current program stage, this important budget allocation has now been adjusted to \$41M. Should there be an increase in the unallocated contingency cost center, the ABP management team, working with the District Office personnel, have evaluated a list of projects that may be activated as part of the ABP Program. Similarly, to address potential program budget deficits, projects are currently being identified that could be removed from the program's active project list and placed in reserve.

In September 2010, as an outcome of the commodity evaluations (See 1.B.12), the escalation study, and of the continued evidence of reduced bid prices, escalation was removed from projects that were scheduled to advertise in Year 3 of the Program.

MassDOT will continue to monitor both Program Unallocated Contingency and escalation cost projections in the years to come. To support this effort, the annual cost escalation study will continue to be performed by an economist.

1.B.12 – Monitoring Major Commodity (Material) Pricing Fluctuations

In order to properly assess the amount of predicted escalation that is to be included in all of the construction cost estimates, a very significant variable on a program of this size, a study was commissioned in the summer of 2010. The purpose was primarily to provide MassDOT with an update to the previously developed construction materials cost escalation forecasts, it also provided a secondary source for the construction cost estimators. Several factors have warranted this reevaluation. During the past year, MassDOT construction bid estimates have been coming in well below the Office's (or Engineers') Estimates, which has caused some reason for concern about an eventual increase in claims. In addition, some economists have expressed concern about long-term deflation, while other industry specialists believe that commodity price increases are likely. As mentioned above, in the fall of 2010, this uncertainty, combined with global economic conditions, had prompted MassDOT to review the previously developed escalation forecasts. This analysis was done using the major commodities that are typical to Massachusetts bridges, by size of bridge, and by type of bridge (concrete or steel).

Long before any of this recent economic uncertainty, to help share the risk of construction costs and to help reduce bid prices, MassDOT had added an economic adjustment clause into most of the construction contracts. This Price Adjustment provision is an ongoing review of material prices, where MassDOT periodically issues price adjustments to typical commodities, such as fuel, liquid asphalt,

concrete, and steel. This ultimately helps to reduce Contractor risk by allowing the Contractor to request payment for significant increases that were not predicted at the time of bid. Although this policy is not meant to eliminate risk (the DOT still needs to properly budget and pay for these material increases), it is certain that it has been a significant contributor to the overall reduction to keep bid prices lower (the Contractors do not need to factor in possible large escalation increases when preparing their bids).

In the future, this same information can be utilized to perform a secondary check of the prices that are used in the “bottoms-up” estimating (described in section 1.C below).

For each construction cost component, historical price movements are investigated and analyzed using data compiled from various sources, including the Engineering News Record’s (ENR’s) Construction Cost Index, U.S. Bureau of Labor Statistics (BLS), and the Commonwealth of Massachusetts Division of Occupational Safety. After a comprehensive evaluation of the factors influencing the construction sector, statistical modeling techniques are applied using these data series to project future market conditions. For each material input, a forecast range of potential values was developed to reflect the uncertainty and historical volatility of commodity prices. The range is defined by low, median (or “most likely”), and high rates of growth. This range does not reflect the absolute low and high values, but rather an 80 percent confidence interval where there is a one in ten chance that escalation rates could be higher and a one in ten chance that they could be lower.

This Technical Memorandum was prepared by a professional economist, with feedback and supporting bridge cost data by Accelerated Bridge Program (ABP) Cost Category, and MassDOT will continue to monitor commodity cost projections in the years to come.

1.C – PROJECT-BY-PROJECT COST CONTROL MEASURES

1.C.0 – Construction Estimating and Contract-Specific Contingencies

Construction Cost Estimating

Generating reliable and accurate cost estimates throughout the entire life-cycle of a project (design phase, bid, construction, and change order management) is vital to the ABP Cost Control Program. All construction cost estimates for ABP projects are being developed in a consistent, systematic, and structured manner. In addition to traditional “Weighted Average Bid Price” Estimating, for selected projects, a “bottoms-up” approach to cost estimating is also being used to develop the Lump Sum Bridge (LS) construction cost estimate. Projects are selected based on their complexity, forecasted value, and/or unique design features.

Quality Control/Quality Assurance Plan - Estimating

A cost estimating Quality Control/Quality Assurance procedure has been developed for the Accelerated Bridge Program. In order to enhance the validity of project cost estimates, most cost estimates prepared for the ABP receive a quality control (QC) review in accordance with this procedure (see Section 1.C.2- Quality Assurance Check – Estimating).

Contract-Specific Contingencies

Section 1.C.4 outlines how much contingency is applied to ABP Projects. Determining an acceptable level of cost contingency based on the current project phase is essential for ABP Program planning and budgeting. The ability to deliver projects within this contingency is a component of measuring the success of the Designers, Contracts and ABP staff.

1.C.1 – Construction Estimating Program

Prior to ABP, MassHighway was adopting a “Weighted Average Bid Price” estimating program. Due to the consistency noted by MassHighway, and to assist in keeping consultant costs lower, it was determined that the Weighted Average program would continue during the early design phases. Bottoms-up estimates cannot be developed at the early conceptual stages of a project since there is not enough scoping information available to allow for detailed development of crews, equipment, and production rates. Consequently ABP project designers use high level parametric estimating (pricing by square foot, cubic yard, tons of steel, etc.) coupled with the application of logical assumptions to develop early conceptual estimates. These early estimates include high contingency costs to account for: the lack of scoping detail; changes to the scope that will inevitably occur as design progresses; known and unknown project risk factors; and market fluctuations that will occur over the life of the project.

At the 75% design stage, Designers (and the independent estimators) are required to perform a validation of the unit prices adopted as part of the final Engineer’s Estimate. It is at this stage that Lump Sum Bridge items (and any other significant lump sum item) are derived using the “bottoms-up” approach, from an independent cost estimator.

If done properly, the ‘bottoms up’ cost estimating approach is more effective because estimates are developed based on production rates that are applied to updated material prices, updated labor prices, and updated equipment prices. The “bottoms-up” estimate also takes into consideration how the project will be constructed, rather than merely applying unit prices to quantity take-offs. For bottom-up estimates, prices at the detail level for material, equipment, and labor must reflect local/industry pricing to the maximum extent possible. Time and care must also be taken to develop contingencies, overhead costs, general conditions costs, and profit rates in a sound, logical manner, rather than by applying blanket percentages.

A ‘bottom-up’ cost estimate reflects a buildable approach to the work, while at the same time building in a preliminary constructability check. Moreover, crews, equipment, and production rate information can be easily translated into a project construction schedule that is integrated with the cost estimate. This early linking of project cost and project schedule fosters effective cost and schedule control throughout the life of the project.

To ensure all potential costs have been accounted for, in addition to developing costs for each item of work, all estimates contain appropriate markups to account for indirect costs such as overhead, profit, insurance and bonds. All estimates for projects in design, with the exception of those scheduled to be advertised in the current fiscal year, are escalated to the midpoint of construction. Lastly all estimates contain an appropriate level of contingency to account for the stage of design, level of scope, complexity of construction, chance of scope “creep”, construction risk factors, bid climate, etc.

1.C.2 – Quality Assurance Check – Estimating

In order to enhance the validity of project cost estimates, most ABP Designer cost estimates receive a quality assurance (QA) review. All QA reviews are performed by the ABP Project Controls Unit. The QA reviews include; review of the project scope, quantity take-off checks, material pricing review, equipment pricing review, labor pricing review, as well as a review of contingency values and mark-ups applied.

In addition, a third-party has been contracted by MassDOT to perform independent “bottom-up” cost estimates on selected projects based on their complexity, forecasted value, and/or unique design features. In these cases, a reconciliation of the Designer’s cost estimate and the independent cost estimate is performed, and any major discrepancies are reviewed with all parties prior to final development of the Office Estimate used to determine the advertised contract value.

At this point in the Program, over 30 independent “bottom-up” estimates have been developed and over 70 Designer cost estimate Quality Assurance reviews have been performed.

1.C.3 – ABP Estimating Group

The Project Controls Unit includes a group of professional cost estimators. This group is essential to ensuring the project design meets the construction budget expectations. Whereas each design professional in the team may work on a subset of the project scope, the estimators must become familiar with all content in all documents, and will frequently identify issues that may not otherwise be apparent to the design team. Developing estimates with the mindset of developing a bid estimate allows the estimator to produce valuable feedback to the design and owner team regarding final document clarity, accuracy, bidability, and constructability.

The intent of the ABP Estimating Group is to:

- ensure a high degree of accountability for elements of work that the Designer/Engineer can control during the later stages of the design process;
- assist in promoting transparency and ‘reality’ of the true cost of construction
- allow ample time to make corrective action during the design phase; and
- promote a standardized approach to reviewing cost estimates at a Program level.

The ABP Estimating Group is responsible for the following:

- Reviewing Cost Estimates (including quantity and pricing information) from Designers.
- Reporting the status of cost at a Program Level.
- Formally commenting on differences in the cost estimates at different stages of design.
- Generating Estimate Reconciliation sheets to show why the estimates have changed from one stage to the next.
- Identifying and monitoring those aspects that the Designer is accountable for – alerting Program Management and design managers of discrepancies with recommendation to mitigate.
- Review ‘method of measurement’ and ‘basis of payment’ provisions and payment items.
- Develop and maintain a standardize construction cost estimating pricing, bid items, procedures.
- Monitor bid results and participate in bid approval.

1.C.4 – Contract Specific Cost Contingency – from design to construction

The Project Controls team has established an appropriate level of contingency to apply to each project based on the current design stage. To validate the 15% Construction Cost contingency that has been implemented on nearly all of the ABP Projects that have progressed into construction thus far, MassDOT has performed a study of the past bridge project completion costs and timeframes. This study has examined the bridges that have completed over the past 5 years and compared the bid value vs. the actual Cost-at-Completion to determine a reasonable percentage for which to budget. The conclusion from this study was that the 15% contingency was appropriate for the majority of ABP projects.

Pre-25% Estimates

A cost contingency of 30% is being applied to all projects that are at the pre-25% design stage. This level of contingency was established to account for: the lack of scoping detail; changes to the scope that will inevitably occur as design progresses; known and unknown project risk factors; and market fluctuations that will occur over the life of the project.

Preliminary Design- 25% Design Stage

As a design starts to evolve, and as drawings allow for quantity development of major commodities, the professional estimator works with the design team to develop an allowance basis of “immeasurable items” (example: assume #6 rebar at 6” on center). Therefore, a construction cost contingency of 20% is applied to all projects at the 25% design stage.

75% Design Stage

In the later stages of design, as drawings progress to allow for much more accurate quantity takeoff and pricing, and as a construction scheduler can start to develop a crew-based approach to much more accurately define critical paths in the preliminary construction schedule, a “Detailed Control Budget” can be reasonably established. A 15% contingency is applied from 75% design through completion of the design.

Advertisement

At advertisement a contingency of 15% is applied to each project to establish the project budget. It is important to note that contingency is not applied to the office estimate, or anticipated bid amount at advertisement. The Office Estimate is to be developed to provide for a reasonable cost projection (and not a prediction of the low bid), excluding contingency. For budgeting purposes however a 15% contingency is carried on all projects to account for identified risk/exposure determined during final design stages.

Construction Phase

Once in construction, the same 15% contingency is utilized and budgeted for within the Program Control Budget to account for potential cost growth during construction.

1.D – CONTRACT COST MANAGEMENT

1.D.0 – Contract Cost Management Summary

The ABP has adopted effective, industry-proven, contract cost management measures. These measures include Constructability Reviews, Claims Avoidance Reviews, Contract Trending, and effective Contract

Administration. When combined, all of these measures allow Program Management to optimize management and control of costs at the project contract level.

1.D.1 – Constructability Reviews For Select Contracts

Performing constructability reviews on construction contracts during the design phase is a proven method for optimizing construction contract costs and schedules. An effective constructability review identifies project elements contained within the design documents that will hinder efficient construction and may add unnecessary cost and time to the construction project. Constructability reviews ensure that specific construction knowledge and expertise are incorporated into the design of each project contract.

Constructability reviews are performed by the DUCE (District Utility and Constructability Engineer) in each District office. These constructability reviews are performed early enough in the design process to allow for incorporation of pertinent comments and recommendations with minimum chance of requiring major re-design or design change.

1.D.2 – Claims Avoidance Reviews For Select Contracts

Claims avoidance reviews identify specific areas within the project contract documents that are prone to construction change orders and claims, and provide specific recommendations on how to mitigate that exposure. It is not possible to completely eliminate claims and change orders from the construction process; however, performing claims avoidance reviews during design is a highly effective means of minimizing claims and change orders during construction, and in turn minimizing construction contract costs and optimizing construction contract schedules. The potential cost and schedule savings from an effective claims avoidance review far outweigh the cost of performing the review.

Claims avoidance reviews have been performed on select site-specific ABP projects based on their complexity and/or meeting an estimated contract value threshold of \$6 Million. So far, the ABP Project Controls Unit has completed 13 claims avoidance reviews with several currently in progress.

In addition to the 13 pre-bid claims avoidance reviews completed, the ABP Project Controls Unit also has performed post-bid “claims avoidance check-ups” on the Craigie Dam & Drawbridge project and BU Bridge project. These projects were already contracted at the time claims avoidance review procedures were initiated on the Program, but a review for possible claim risks was deemed prudent. Though not as effective as a pre-bid review, where the results of the review can be incorporated into the pre-bid design documents, a post-bid review allows the contract management team to mitigate risks prior to any potential claims being submitted.

1.D.3 – Effective Contract Administration

In 2011, MassDOT is embarking on a major effort to develop a comprehensive Resident Engineers manual that will involve extensive revisions, updates, and new standards/procedures. This will be extremely valuable to the management of construction projects in the future.

Additionally, the MassDOT Management has implemented contract administration procedures, along with instituting an atmosphere of mutual cooperation between MassDOT and construction Contractors, to enhance the likelihood of successful projects, while minimizing the exposure to protracted disputes and their associated costs and schedule delays.

MassDOT has recently completed a significant overall to the claims process. With an outreach program to the contracting community, MassDOT has explained the new claims process and it appears to be working very well. Evaluations of claims and extra work orders are an ongoing process and MassDOT will continue to monitor very closely.

A good example of effective contract administration has been demonstrated on a recently completed ABP project. The Indian Head River between Hanover and Hanson was a display of effective cooperation between the Contractor, MassDOT and the communities. A Value Engineering Cost Proposal (VECP) to use pre-fabricated bridge elements versus cast-in-place elements was submitted and accepted. Additionally, an agreement to close down the roadway was reached by all, and these cooperative changes reduced the construction duration from three years to just 9 months, saving the Commonwealth nearly 30% on construction costs.

SECTION 2 – SCHEDULE CONTROL

2.A – DESIGN PHASE SCHEDULE CONTROL

2.A.0 – Design Phase Schedule Control – Summary

In the summer of 2010, MassDOT started to implement new Design Phase Schedule Controls into existing Design contracts. The ABP team updated the Design Schedule Template which had been implemented prior to 2008. In addition, MassDOT issued new guidance on how to use the template to promote better communication throughout the design progress.

Moving forward, each ABP Designer team must develop and maintain a more detailed design schedule that will be used to monitor and track design progress; critical design tasks; critical decision dates; and critical actions required by all parties involved in the design process. These mandatory design schedules will ensure that the design phase is progressing efficiently; will foster more in-depth and transparent design planning; will develop an auditable trail of accountability; assist in change management and budgeting; and support portions of the ABP legislative reporting requirements.

Effective design schedule control will result in a comprehensive and collaborative project plan that includes input from permitting, right-of-way and other regulatory agencies, with accurate internal and external review durations. The following three documents are now being used to support these key elements.

Project Design Schedule

In the summer of 2010, an improved design schedule was developed to track major design, environmental and right-of-way deliverables and status. This now provides a more streamlined reporting of the project development stage using software that can track and subsequently report on project status, performance, historical project information and forecast project completion. A major objective is to obtain consistent information that may be rolled up to the project and program level. These Project Design Schedules are currently being developed and maintained using MS Project or Primavera Scheduling software. The Project Design Schedule is now being used on all ABP projects, by the Design Consultant and MassDOT, for planning and monitoring the progress of the design work.

Design Consultant's Monthly Narrative

A monthly summary report which includes the following information:

- Overview
- Accomplishments for the month
- Upcoming key deliverables
- Critical action items (listing person responsible and *need date*)
- Summary financial report
- Project Meetings – past and future
- Community meetings

Scope Statement

A descriptive statement of the project scope is developed and managed by MassDOT's Design Manager. As scope requirements evolve, scope statements are revised and updated. When significant scope changes are made, the designer is required to provide justification and document the events that prompted the scope amendment.

The following additional design phase enhancements have been developed and implemented over the past year.

Design Schedule Requirements

Design requirements were developed to support the proper development of design schedule submittals. The document outlines technical and submittal related requirements for the proper reporting of the design stage.

Design Schedule Development and Update Procedures

Guidelines were generated to support the proper development of Design Schedules to ensure uniformity, which will allow projects schedules to be "rolled-up" into a master design schedule.

Training for Schedule Development and Update Procedures

A training module to support the proper development of Design Schedules has been developed and deployed.

Design Schedule Review Procedures

A checklist has been prepared to support the review of design schedules, and to ensure adherence to design schedule requirements. The review and analysis of the Design schedules will allow for improved schedule projections for the design development stage, as well as control project performance by early identification of issues.

2.A.1 – Schedule Management and Performance During Design

MassDOT currently requires ABP Design Consultants to provide in-depth and transparent design planning.

This portion of the program control plan consists of the following elements:

Design Performance Ratio

The Designer Work Hour Estimates sheets require the Design Consultants to provide a detailed breakdown, by design discipline, of the anticipated work that will be required. This estimate, along with the monthly design schedule updates, and the invoices, are now in place to allow the MassDOT Design PM to quickly identify areas of concern. Although the original concept of the Design Performance Ratio is not being utilized, the Designer's performance will be measured with the Consultant Evaluation Forms.

Project Design Schedule

Design Consultants are now being required to prepare and submit Design Schedules as part of their invoicing. This schedule will outline the activities to accomplish the design work and will be founded upon the newly updated MassDOT Design Schedule Template.

In the near future, MassDOT will evaluate a requirement for Designer's that are working on larger projects, to submit a Project Management Plan, which establish the framework for the project, including the organization of participants, responsibilities, decision structure, channels of communication and procedures.

Project Tracking Points

The project design schedule includes interim design completion milestones, and clearly defines the progression of Work from NTP to design completion by using separate activities for all significant design components. This is being done with only slight modifications compared to the 30 tracking points that were originally proposed in the December, 2008 Project Controls report.

Most of the ABP Design Consultants are now required to update and submit the monthly Project Design Schedule. The monthly update shall: describe work completed during the reporting period; describe work planned for the next reporting period; explain and comment on schedule delays; provide costs-to-date and a statement of the adequacy of the remaining design budget; indicate MBE/WBE/DBE activities; and indicate anticipated problems with recommended solutions.

Design Consultant's Monthly Report

As part of the monthly requisition for payment, most of the MassDOT Design Consultants are required to prepare a monthly summary report to include the following aspects:

- Overview
- Accomplishments for the month
- Key deliverables upcoming
- Critical action items (listing person responsible and *need date*)
- Summary financial report
- Project Meetings – past and future
- Community meetings

2.A.2 – Scope Statements

Industry experience has shown that infrastructure project scopes have an inherent tendency to change over time due to a variety of factors. These scope changes almost inevitably result in changes to project costs and schedules. Accordingly, it is **essential to record and monitor project scope** from project inception through final construction completion. Tracking and recording all changes to project scope enables accurate, effective management and reporting of associated cost and schedule growth. Early development and continuous updating of project scope statements is a tool that enables MassDOT to monitor and control the effects of scope changes on all ABP projects.

MassDOT Design Project Managers develop a scope statement for each ABP project at initial project inception. The scope statement is revised and updated at each stage of the design.

The function of this control measure is to:

- assist in overall change management;
- assist in promoting transparency and ‘reality’ of the true cost of construction;
- allow ample time to take corrective action during the design phase; and
- promote a standardized approach to developing the early scoping documents, and managing and controlling project scope over time.

2.B – CONTRACT TIME DETERMINATION

2.B.0 – Contract Time Determination – Summary

MassDOT has made several significant advancements with regard to construction planning and construction scheduling. The planning term ‘Contract Time Determination’ (CTD) is a focused effort to evaluate how long it should take a construction Contractor to build a project, while recognizing all known constraints/restrictions, and an optimal progression of the work, and is done so with consideration to price. In order to minimize costly delays during construction, it is vital that a Critical Path Method (CPM) Schedule be developed during the planning stages of every ABP project. This CPM schedule needs to be founded upon the critical elements of the contract documents (including limitations of operations), the corresponding construction cost estimate data, and a reasonable determination of the possible construction means-and-methods.

During the design phase, MassDOT has utilized professional construction schedulers to help prepare construction schedules for most of the ABP projects. This Contract Time Determination study is being utilized to establish a Program Performance Indicator, and is later reviewed/updated to establish the Contract Time (i.e. the contractual duration). The CTD’s are developed with consideration of critical information (crews, equipment, production rates, quantities, construction sequence) from the construction cost estimate.

It is also noteworthy to mention, that in the spring of 2010, MassDOT completed a new Standard Operating Procedure for preparation of CTD’s. This new procedure has already helped to improve credibility with the contracting community and has helped build a defensible position should a claim arise.

During initial construction, the construction Contractor’s Baseline Schedule submission is compared with the CTD schedule as an evaluation tool. This will ensure that the contractor has incorporated all scope elements in their schedule, is not positioning for a schedule claim, is utilizing the schedule to logically plan the work, and has planned the work properly to avoid major surprises or delays.

2.B.1 – Contract Time Determination (Pre-Bid Schedule)

Critical Path Method (CPM)

The Contract Time Determination schedule and the construction schedules that are required from the Contractors will be developed using CPM. This method is the industry standard and calculates the longest path of planned activities to the end of the project, and the earliest and latest that each activity

can start and finish without delaying the project. This process determines which activities are "critical" (i.e., on the longest path) and which have "total float" (i.e. can be delayed without delaying the project).

In the fall of 2010, in order to increase the Designer's accountability, MassDOT started to implement a plan to have many of the Designers plan the construction sequencing. In some cases, it is now the responsibility of the Design Consultant (on site-specific construction contracts greater than \$1 Million) to utilize a qualified construction scheduler to develop the Contract Time Determination schedule. A schedule submission is required along with the submission of each construction cost estimate from 75% design onward. The rationale for doing this is to elevate the Designer's accountability for planning the constructability and sequencing aspects of their design. This is one of the elements of the Designer's performance that is taken into consideration when evaluating whether they should participate in future MassDOT projects.

Utility Planning – Contractor incentive

Historically, utility related delays have impacted construction phase schedules more than any other external factor. The first initiative taken was to implement utility coordination early in the design phase, as well as field meetings at the 25% design phase.

Another significant advancement that MassDOT has taken recently is the implementation of what is called contract 'Access Restraints'. This construction contract term is designed to ensure that all of the bidders are planning their work with the same time related information, and in a defensible manner. This will ultimately help to prevent many significant claims and construction phase delays.

With the coordinated assistance of the MassDOT Utilities group, and the Design PM's, earlier utility coordination, along with incentive based goals for the utilities, have been implemented on the ABP projects. The procedures utilizes Access Restraints as the primary means of contractual expectation/communication. The Access Restraint lets the Contractor know that they are prohibited from working in certain areas until a utility company relocates the utility that is impeding the progress of the construction contract. This in turn allows the Contractor to plan their base contract work accordingly. Should there be a change to the time period stipulated in the Access Restraint, if the impacted activities were on the critical path, the Contractor will have a right to request a time extension.

2.B.2 – Quality Control Plan - Contract Time Determination

Quality Control for Contract Time Determination

As the Design community start to develop their own CTD's, MassDOT is utilizing the Project Controls Unit to develop reviews of the CTD's. The reviewer is responsible for ensuring that the following important time related elements are included in the Contract Time Determination schedule:

- time required for the Contractor to plan the work and mobilize prior to starting physical work;
- preparation of critical submittals;
- review of critical submittals (by designer);
- procure/order materials;
- fabricate and deliver long-lead items;
- testing;

- commissioning;
- winter restrictions; and
- agency/utility/city restrictions.

As of December 2010, the Project Controls Unit has developed 67 CTD's.

Quality Control Review Guidelines – for CTD's

All schedule QC reviews are being performed by a MassDOT Construction staff member. The Schedule Reviewer uses the procedure referred to in the original December 15th, 2008 Project Control Report.

2.B.3 – Delivery Method – Use of Design-Build Contracts

Design-Bid-Build (DBB) has historically been the routine project delivery method used for MHD and DCR projects. It is commonly accepted in the design and construction industry that using the Design-Build (DB) project delivery method will result in a shorter project durations due to the overlap of the design and construction phases.

Another recent MassDOT advancement has been the evaluation of the DB entity's (Designer/Contractor) schedule as part of the selection process. The purpose of this initiative is to reward the Contractors who plan in advance of the start of construction, and to promote good scheduling capabilities. The DB entity's schedule is evaluated independently and a score is generated to quantify the schedule competency.

DB Entity Schedule Competency Evaluation

The DB entity's schedule will consider the following aspects that MassDOT values in effective schedule/cost control:

- Schedule coding
- Work Breakdown Structure/Schedule Organization
- Schedule Detail (activity durations, # of activities, and ample description of work)
- Schedule Logic competency (enough detail to support routine CPM calculations as the project progresses, predecessors, and successors)
- Organization of the Critical Path and all of the other paths (total float)
- Cost Loading (relationship to the bid price, activity level breakdown, relationship to planned resources, and utilization for invoice support and cash flow projections).
- Cash Flow Projections
- Responsibility Coding (including designer, subs, suppliers, MassDOT, etc.)
- Design and Construction Submittal management – (completeness of list, preparation, review, approval, coding, prioritization and relation to the start of work)
- Designer schedule management and activity detail (responsibilities, logic, and resources)
- Resource Loading (labor / crews, and equipment detail/activities)
- Production Rate Basis (relationship to the crew planning and bid values)
- Considerations for all of the necessary steps needed, prior to the start the physical work, such as special permits and approvals that are not already included in the submittals and that the level of detail/activities is appropriately)
- Construction phasing and traffic management planning (amount of activities are appropriate for weekly planning and proper execution)

- Payment/Invoicing (relationship to the schedule and bid values)
- Critical Schedule Management Reporting (provide portions of example reports that will be used)
- Integration of schedule activities with document control
- Other “specific requirements” that are referenced in Section 6.3.3.2 below
- Detailed Daily, Weekly, Monthly Schedules (showing critical path for each)

Also including

- a description of the schedule “updating” process will be implemented (recording of actual progress, forecasting, optimizing, etc.);
- a description of how the project manager, design manager and site supervisor will use this schedule information;
- a description of how this information will be used in project management meetings; and
- a demonstration of the chosen scheduling software capabilities

Proposers that do not comply with this requirement may be deemed to be non-responsive.

This Schedule Competency evaluation is new and will be evaluated after several of the larger D/B procurements have been completed.

2.C – CONSTRUCTION SCHEDULE CONTROL

2.C.0 – Schedule Management During Construction

Heavy/highway Contractors often generate construction claims that are founded on the schedule progression. However, without detailed requirements and enforcement, the construction schedule may not be defensible and is often not usable. As a result, the Owner (MassDOT) is left with little to present in defense of the claim. To counter this, and to assist in ensuring that the Contractors progress the work quicker than in the past, MassDOT has made many significant advancements in construction scheduling over the past 2 years – many of which are summarized as follows:

Introduction of a new Construction Scheduling specification

- Cost loading
- Resource loading
- Schedule narrative
- Baseline, monthly updates, revised schedule, recovery schedules, and proposal schedules
- Implementation of a new schedule payment incentive clause
- Deployment of construction schedulers into the District Offices
- Schedule training
- Deployment of standardized schedule coding
- Increased emphasis on the “on-time” performance goals
- Improved ability to forecast construction cash flow demands
- Improvements in timeliness to project delay – supporting timely corrective action
- Improved schedule organization and standardization
- Implementation of a new schedule payment incentive clause
- Improved time delay defenses
- Improved ability to resolve the larger disputes – escrow bid documents

- Planning for future Project Controls staff (state employees) to assume the dedicated district scheduling role.

The construction schedule control program has been designed to:

- Provide the MassDOT Resident Engineer's and Construction Engineer's with training sessions on best practices of construction schedule control (including Primavera or equivalent, CPM, Work-Session, Schedule Recovery, Critical Issues Reporting, Documentation, and Field Verification).
- Develop and implement a standardized approach to construction schedule reviews and construction delay analysis.
- Provide the MassDOT's senior managers with the necessary tools and resources to ensure that Contractors are progressing diligently.
- Ensure that the proper critical information flows from the field to the program level, to ensure that informed program level decisions are made efficiently and effectively.
- Ensure that proper documentation is provided to build the necessary audit trail in defense of time-related delay claims.

Introduction of a new Schedule Specification

In prior years, MassHighway required a simple, one-time submission of a schedule that did not support defensible procedures for progress monitoring, delay analysis, dispute resolution, litigation, nor was this simple submission in compliance with the industry accepted standards. The new schedule specifications call for a monthly schedule submission, important for legal issues related to contemporaneous delay defenses.

As part of the new Contractor schedule specification requirements the Contractor has to "Cost and Resource Load" the schedule. Put simply, resource allocation is "proper planning" at its most fundamental level. 'Bar charts' (simple schedules) contain dates and activities with no real production rate basis to validate the dates.

Resource Loading:

Contractors bid their work by generating an individual cost for each operation/activity, deriving from labor, materials, and equipment. The Contractor estimates the time required by establishing the production rates for each of these individual activities. The resource loading requirement simply provides a transparent accounting of that Contractor's bid. Each schedule activity contains an assignment of the estimated labor to complete the work. Without this, MassDOT has no true way of understanding what the Contractor's plan is based upon.

Resource loading helps all of these facets of construction oversight:

Validation of the Contractor's Basis/Plan

An estimator or scheduler can review the basis of the individual tasks and the overall schedule basis. From that effort, formal review comments can be generated and revisited as the Contractor progresses the work. Many times, it can be helpful in identifying aspects that appear to have been underestimated by the Contractor. It gives MassDOT the ability to monitor the Contractor's performance against their original plan. With planned resources (labor hours) provided at the activity level, field inspection staff can provide spot checks on crew sizes, labor

hours worked/day, and validate the progress of the critical path activities. This is a tremendous benefit.

Improved Production

By providing MassDOT with the ability to monitor the Contractor's operations, the Contractor is less inclined to claim MassDOT has caused delays. If the Contractor progresses their base contract work slower than planned, without due cause, MassDOT has a much stronger basis to require a recovery schedule. Many times the Owner can quickly demonstrate that the Contractor's plan is flawed and require correction at no cost to MassDOT. This is done by evaluating the critical path activities (that were not delayed or changed by MassDOT) thereby demonstrating the Contractor's responsibility to correct the issue or recover the time lost.

Improves Approval Time for Extra Work Orders (EWO)

By providing a solid schedule foundation, MassDOT and the Contractor can use aspects of this resource loading to arrive at a mutually beneficial conclusion to EWOs in a timely manner.

Supports Claims Analysis

By providing a more detailed schedule foundation, there are many times that this information proves useful in "untangling" many of the causes of the delays, and the extent that they were truly critical to the completion of the work. Often times MassDOT, using the resource plan that the Contractor provided, can prove that the alleged Owner Caused Delays were not the true delay – rather, had the Contractor progressed the work, using the same amount of resources that were planned, many of the delays may have never occurred. Other times the evaluation of actual resources utilized, proves that MassDOT had/has additional time to resolve many of the common issues that are often incorrectly categorized as Owner Caused Delays. Additionally, many of the claims are submitted with the Contractor's demonstration of costs – these costs need to be validated based upon the time aspect of many of the claims submitted. Resource loading is very helpful in this regard as well.

Cost Loading:

Similar to the resource loading, the Contractor is required to submit a cash flow analysis by assigning the planned/estimated costs of the work at the individual task level.

Cost loading the Construction Schedule improves the accuracy of cash flow projections for each project even after many changes/delays have occurred. Additionally, cost loading at the project level improves the accuracy of Program level budgets when consolidated and summarized.

Schedule Support has been deployed to the MassDOT District Offices

Prior to the ABP, the Deputy Chief Engineer for Construction derived a plan to deploy professional construction schedulers in each of the MassHighway District Offices. Today that plan is in place and is very successfully allowing for an increased awareness of the utilization of construction schedules. With seven construction schedulers, as part of the Project Controls Unit, now supporting the ABP contracts, Resident Engineer's and Construction Engineer's are learning about the new process, how to use the requirements to the benefit of MassDOT, and what to do when delays occur. Additionally, as part of the Project Control Unit's training responsibilities, each one of these schedulers is tasked with helping MassDOT employees learn through training classes, and through working together on real life examples of the schedule review process.

Schedule Narrative

In order to assist the Resident Engineer's that have not been trained in schedule software, MassDOT is now requiring that a schedule narrative be provided with every schedule update the construction Contractor submits. This will detail the current status of the project, work performed in the past update period, and all changes to the schedule being proposed in the schedule submittal.

Schedule Reviews

As part of the Schedule training program, the construction schedule reviewers, with the assistance of the Project Controls Unit schedulers, are now being trained to be responsible for:

- review and comment on the Contractor's baseline schedule;
- participate in contract status meetings;
- verify actual progress in the field – including construction resources planned vs. actual;
- generate ideas and studies to recover time delays;
- review, comment on, and present monthly status update submittals;
- summarize and report on key schedule aspects of the individual projects to the upper program level;
- support District Manager functions related to schedule reporting and presentations; and
- prepare and present aspects of schedule delays and Claims for Time

To expand, through the training program, MassDOT now emphasizes the need to thoroughly review the Baseline Schedule submittal as it is the starting point against which all delay and production issues are measured. It is the comprehensive review of the Contractor's initial work plan for completing the project within the specified contract duration. To assist in the review of the Baseline, the PCU Scheduler(s) often utilize the valuable information that is developed as part of the Contract Time Determination schedule. The Baseline Schedule is compared against this document to see how the Contractor's planned approach to the project varies in planned production, sequencing and milestone completion. In many cases, this has helped to quickly identify problems (related to scope, intent, production, restrictions, etc.), and is part of the documented review comments that MassDOT develops. Similar reviews must continue to be performed on the Monthly Updates, the Revised Schedule Submission, the Proposal Schedules and the Recovery Schedules alike.

Implementation of a new schedule payment incentive clause

MassDOT has added a "fixed price" payment item, into most of the recent construction contracts; to serve as an incentive for the Contractor to submit timely and accurate schedule submissions, to allow for a disincentive for non-conformance (non-payment), and to ensure that all bidders equally recognize that MassDOT expects the schedule requirements to be achieved consistently.

Schedule Training

In the summer of 2010, MassDOT implemented an ambitious schedule training program in which professional construction schedulers/trainers work with MassDOT Resident Engineers and Construction Engineers, as part of the Foundations in Construction Schedule Training.

As of December 2010, initial groups within each of the 6 Districts have received this training, and follow up sessions are now on-going and expected to progress over the next year.

The Foundations in Construction Schedule class was developed under the review of the Deputy Chief Engineer for Construction, with the main goals of developing a general understanding of CPM Scheduling, a familiarity with the new schedule spec, an understanding of the most important aspects of what needs to be done when a Contractor submits a schedule, and to demonstrate how it can be used as a review tool for MassDOT to keep the Contractor progressing, avoiding delays/claims.

Unit 1: Overview

Unit 2: Primer to Construction Scheduling

Unit 3: Review of the MassDOT ABP Schedule Spec

Unit 4: Critical Path Method (CPM) Scheduling

Unit 5: Understanding the Baseline Schedule Development

Unit 6: Resource & Cost Loading a Schedule

Unit 7: Reviewing the MassDOT/ABP Status Schedules

Unit 8: Introduction to Delay Analysis

Unit 9: Project Scheduling Software Primer

In January of 2011, the second major course will be developed. This course will advance the familiarity of the CPM Scheduling concept, and provide workshops in schedule reviews and issue resolution.

All of these courses, along with the other training programs related to project tracking systems, are being offered with the involvement of the MassDOT human resources/training department.

Increased emphasis on the “on-time” performance goals

To fulfill the requirement of both the Acts of 2008 and the Acts of 2009, MassDOT has implemented changes to highlight one of MassDOT’s most important performance measures, on-time goals. Through the schedule training sessions described above, the Quarterly Oversight Council reports, the MassDOT web-site updates, and the MassDOT performance management scorecard, every MassDOT employee is informed of the goals, the legislative requirements, the current status, and that their part in achieving the goal for MassDOT.

Improved ability to forecast construction cash flow demands

With the implementation of new construction schedule requirements, MassDOT has now realized an improvement in the ability to forecast construction spending more accurately, a cash-flow based on project completion dates and expected budgets at completion. The cash-flow is used as a verification of the program's expected yearly expenditure. The current distribution, using a realistic bell-curve distribution, also accounts for lag in payment disbursement, contingency, and seasonal inefficiency. However, it has been recognized that further advancements can be made by utilizing the cost loaded schedules from the Contractors submissions, in a master schedule. This effort is still premature, at this time, because of the complexities associated with getting many people (including Contractor’s) trained on the utilization of the cash flow projection components of the scheduling software. In future months, additional improvements may be realized with the implementation of a pilot program to utilize an Earned Value payment provision in some of the larger ABP Contracts.

Improvements in timeliness to forecast delay – supporting timely corrective action

With the implementation of new scheduling specifications, the assistance from construction schedulers in the District Offices, and the examples that are being presented in the construction scheduling training classes, there is now an increased sense of control over the Contractor's progress. MassDOT is now seeing real examples of how these new schedule requirements are helping to motivate the Contractor to complete projects as quickly as possible. In the past, without the schedule controls in place, Contractors would have the advantage when it came time to demonstrate delay. Now, with a more proactive schedule review, projections can be made by MassDOT, well in advance of significant delays, to put the Contractor on notice for their obligation to recover.

In two recent high profile MassDOT projects, after seeing measurable progress fall behind the Contractor's original plan, with no cause for delay by others, the Contractor was informed of this and provided notice to recover. After doing so, on the first project, a forecast of 5 months delay was recovered to just 1 month delay. After realizing that the Contractor was not meeting planned production, additional equipment and crews were deployed to work multiple areas. In the other case, the other Contractor is currently working on a recovery plan after being put on notice that the cause of delay was not MassDOT or the Designer. The significant point here is that the documentation of this new proactive approach is vital to the evidence that is needed to deny or approve a time extension – and more importantly, to assess liquidated damages. This ultimately will continue to 'change the culture' of the past, within the contracting community and within MassDOT itself, and focus all parties on getting projects done.

Another notable improvement in having all of these enhanced scheduling requirements, is a better understanding and better way to properly identify critical answers that MassDOT (and Designers) need to provide to the Contractors to avoid owner caused delays. With the new monthly Critical Path Method (CPM) scheduling in place, the Contractors are now required to properly identify and prioritize all of the critical submittals. This has and will continue to help MassDOT prioritize its own resources. Over the next year, as MassDOT plans to develop new procedures/systems to track Requests-For-Information (RFI) and submittals, this CPM requirement will be incorporated to assist in ultimately setting the priorities. These initiatives will greatly help to continue to progress the critical work on projects.

Improved schedule organization and standardization

In an effort to help the construction contracting community provide a consistent and accurate schedule, as well as assist with MassDOT's review of construction schedules, MassDOT has recently created a "tool kit" for the Contractor's use. This tool kit is essentially a standardized starting point for the development of a MassDOT schedule, saving a significant amount of time for all of the Contractors, Designers, and State staff that need to prepare construction schedules.

The "tool kit" will be updated periodically, is available to all, and contains the following information:

- Guidelines for schedule development,
- Schedule template for scheduling software,
- Schedule layouts – showing the standard reporting displays,
- Example schedule reports,
- Suggested guideline: assigning baseline

- Suggested guideline: cost & resource loading

These guidelines and tools were developed to aid the Contractor in developing a schedule that conforms to the specifications. It remains the Contractor's responsibility to ensure that their schedule submittal correctly meets the requirements of the specification, correctly reflects the project scope of work, the means and methods, and planned sequence of work.

The Contractors are also referred to the specification as it still contains further detailed information about the scheduling requirements.

Improved time delay defenses

In a recent example, a Contractor, after being denied a time extension, submitted a claim for nearly \$1 million, and started legal proceedings. MassDOT, through the use of the schedule submissions, worked with the Contractor to better understand the alleged impacts that were introduced into the contract, shortly after the work started. With MassDOT Construction/Delivery and MassDOT Legal, working with the MassDOT Project Controls Unit, and the new schedule requirements, this claim has been settled outside of court, for a fraction of the original cost. The resolution of this claim could not have occurred as favorably as it did, without the new schedule initiatives that MassDOT has implemented over the past year.

Improved ability to resolve the larger disputes – escrow bid documents

MassDOT-Highway has recently developed an advanced Escrow Bid Document specification for contracts greater than \$10M. This is another enhancement designed to improve MassDOT's ability to resolve significant disputes in a timely manner, to improve the credibility and transparency of the contracting community, and to improve how Contractors plan their estimates. The purpose of this specification is to preserve the bid documents of the successful bidder/Contractor for use by the parties if any claims, change orders, or litigation between the awarding authority and the Contractor arise. Additionally the Escrow Bid Documents specification is intended to create a spirit of cooperation and an atmosphere of transparency between the awarding authority and the bidder/Contractor.

The Escrow Bid Documents may be used to assist in the resolution of authorized price adjustments and Change Orders and/or in the settlement of disputes and claims.

The term "Escrow Bid Documents" is defined by MassDOT, as the "estimate calculations, quantity take-offs, material quotations, or other pricing information used to estimate the cost of each detailed component of the work. The level of detail is to correspond to each itemized component of work consistent with each individual pricing operation/component (e.g. soil compacting component of a backfilling operation). These include the detailed/itemized projection of crew costs, labor costs (for each individual or labor craft category), material costs, equipment costs, and the production rates anticipated for each construction activity/operation detailed within each bid item. The bid back-up should include the Contractors' planned overhead costs, escalation costs, and estimated costs of work that are incidental to the bid items but necessary to complete the contract. If a Contractor is not planning to self-perform a component of work at the time of bid, the bid document back-up and supporting documentation shall include all information constituting the basis of the bid, including but not limited to, the corresponding quotation of sub-Contractor(s), which should include detailed

projection of labor costs, material costs, equipment costs, and the production rates anticipated for each construction activity/operation detailed within each bid item. It is understood that such sub-Contractor may not be under agreement with the Contractor at the time of bid, however, should the Contractor enter into this contract, it is also understood and agreed, that the Contractor bidding the work is solely responsible for the detailed bid prices and estimate basis that have been put forward herein. The term "Escrow Bid Documents" may also include specific reference to components of manuals, which are standard to the industry, used by the Contractor in determining the bid for the project. Such manuals may be included in the bid documentation by reference. Such reference(s) shall include the name and date of the Publication and the Publisher, and must correlate the specific manual information (e.g. line item for production rate or pricing information) to the operation that is being estimated."

It is expected that these new specifications will be implemented into some of the larger Highway Division contracts in February of 2010. Additionally, the Deputy Chief for Construction is currently a member of a national panel to assess the aspects and experiences of escrow bid documents that are being used throughout the country. As any new information is learned from these DOT's, adjustments will be made.

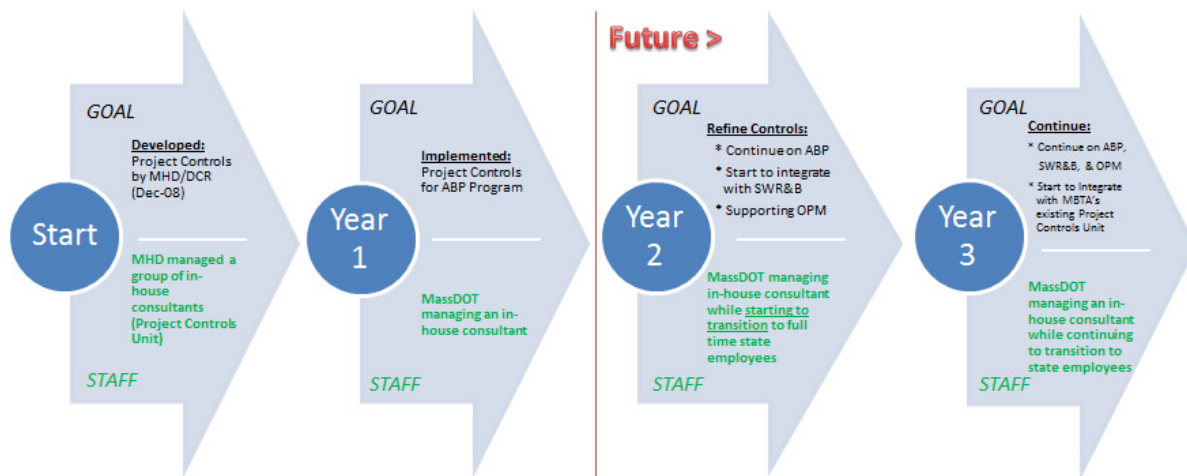
Planning for future Project Controls staff

This section defines how MassDOT plans to further the implementation of the Project Controls, as it was originally developed by MassDOT, and adopted by the ABP Oversight Council, to help manage all capital programs. This coming year, as common aspects continue to be developed concurrently with the Statewide Road and Bridge Program, the MassDOT Project Controls Unit will also provide support for the new Office of Performance Management (OPM) as established under the Acts of 2009. As part of this planning effort, the most significant aspects of this plan are:

- Executive management and Department level management support, involvement, and approval.
- Allocating resources efficiently and timely to cover all of the most critical elements of controls on projects and programs.
- Properly aligning the goals of the entire MassDOT and the OPM, with the effectiveness to properly carry out the core Project Controls principles identified.

Fulfilling the reporting requirements of the Acts of 2008 and 2009.

In the years ahead, Project Controls will be developed in a manner that aligns MassDOT's goals, with staffing and the work-demands of the programs/projects. It is anticipated that staffing levels will never meet the true demands of the various Project Development and Delivery Programs; however, it is the intent of the MassDOT Project Controls Manager, MassDOT Oversight, and the Office of Performance Management to constantly monitor priorities, efforts, and benefits, to fit the changes of the capital plans of MassDOT. This graphic explains these aligning principals further:



In July of 2009, a Project Controls Unit Consultant (Keville Enterprises) was provided a 3 year contract (with an option to renew in year 4 and 5). This contract is to provide project controls implementation, monitoring, and training, as an extension of staff, in two main units – one group in the District Offices (cost/schedule engineers) and the other in the Boston Central Office. Additionally, as part of the Acts of 2008 requirements, this Controls Unit is managed daily by MassDOT's appointed Project Controls Manager, along with Oversight from the Accelerated Bridge Program Oversight Council.

Since the onset of the ABP, the plan has been to transition this group of in-house consultants, to a group of full-time state employees at the start of year 4 of the PCU contract (Summer 2012). This plan requires a phased approach and is heavily reliant upon the implementation of a "shadow training program (STP)" of key Controls people. The STP is essentially a calculated training/transition program in which a selected state employee is teamed up with one of the Controls Unit Consultants to train on key aspects of their particular function (i.e. scheduler, estimator, reporting analyst, etc.). Depending upon the skill level and Controls position requirements, it is anticipated that the STP cycle, for the typical new Controls Analyst, will last over 1 year (for most) and will require greater than 50% of the state employees time during that entire training cycle. This is a notable transition from current duties.

Arguably **the most beneficial aspect** of all of the Project Controls elements that has been implemented by MassDOT is the enhancements to the 8.02 Construction Scheduling Specifications that Mass Highway's Construction Department had already been developing before the ABP Program was initiated. In late 2009 the Statewide Road and Bridge program, working with the ABP, approved the first versions of new scheduling requirements that include monthly cost/resource loaded CPM Schedules (as described in this report).

Additionally, a key facet of this Contractor requirement/enhancement was the need to have a group of experienced construction scheduler's work to train some of the key District personnel on these important aspects: schedule development, Contractor baseline schedule reviews, Contractor update schedules, delay analysis, delay avoidance, time impact analysis, recovery efforts, and general critical path method scheduling. An initial staffing plan, had been developed by MassDOT Construction for this specific purpose, and is likely to be the most logical next step of the Controls Shadow Training Program.

To adequately fulfill the new performance management standards as part of Section 6 of Chapter 25, it is anticipated that the most important priority for this upcoming year will be to provide additional Project Controls support for the development and maintenance of key performance measures within the SWR&B Program.

Related to all of the discussions of this section (above), the following short-term plan will be evaluated to potentially open positions for state employees in the near future:

- 6 positions for cost/schedule analyst assigned to work in the Districts
- 1 Construction Cost Estimator assigned to Boston

In conjunction with the step above, MassDOT will evaluate aspects of the Highway Division that may allow for of reduced department staffing level for cross-training (e.g. as the work-loads in a particular department taper downward, existing staff could be transitioned to fill some of these key roles). It will be important to also develop qualifications for each of these positions, to be utilized when MassDOT is hiring new staff. The initial phases are now underway.

These select employees will be ‘teamed-up’ with the appropriate Project Controls Unit Consultant to:

- Train on software, procedures, methods, and principles
- Attend key learning meetings (with Contractors, Designer, other DOT departments, etc.)
- Assist in data collection, validation, analysis, and reporting
- Refine Standards of Practices and other procedures for project controls implementation
- Gradually becoming less dependent upon training to act and advise others
- Generate a quarterly report, to be issued to Oversight and the OPM, providing an update on progress of this Project Controls expansion initiative

2.C.2 – Integrated Program Schedule – From Contract To Program Level

To assist with the overall tracking of the 205 active ABP Projects, a master schedule report is generated quarterly to show the variances from the original 30-Nov-2008 Three Year Plan listing, versus the previous quarters. This report is posted on the ABP website, included in the Oversight Council Report, and is provided to MassDOT staff for communication of goals and status. This change management and reporting tool will continue to be used in the months/years ahead.

Currently, MassDOT has decided (in consideration of all of the other priorities that need advancement), that there is no significant need to generate any enhancements to the master schedule beyond what is currently utilized by ABP Reporting.

Below, shows an example of the summary master schedule that is posted in the Quarterly Council report and on the ABP Website. This controls tool has also been instrumental in keeping the municipalities, legislators, oversight council, and MassDOT staff informed of changes, and constantly informed of the progress concerning one of the most important goals of the program.

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The main objective of these meetings are/will be to:

- generate a formalized senior management review process that allows for program level priorities to be evaluated and acted on as efficiently as possible;
- evaluate cost and schedule controls that primarily focus on identifying schedule related concerns and working out a swift course of action; and
- develop action items to recover delays (and/or costs) and monitor status at subsequent meetings

Critical Action Item Meetings, as described in the December 2008 Project Controls Report, have not been incorporated into MassDOT's Standard Operating Procedures as of yet. However, it will be a consideration as the new MassDOT Resident Engineer's manual is developed in 2011.

2.C.3 – Schedule Recovery Work-Sessions

As the larger contracts experience delays, MassDOT intends to initiate a formal Schedule Recovery Work-Session program. This program will be utilized on contracts with poor schedule performance and whenever the critical path has delayed the completion of work by more than 60 days.

The main goal of this program is to help explore options to recover lost time for delays.

The following is a listing of the key principles that will be utilized:

- the Contractor is informed that cooperation in this matter will help to expedite resolution;
- posturing, from all parties, is to be put aside;
- the Contractor's latest schedule is to be analyzed and tested for "what-if" options;
- the session must be attended by "the people that are actually doing the work";
- requires commitment from senior members of MassDOT, the Contractor, and the designer;
- if multiple Contractors and sub-Contractors are involved, they all need to be represented;
- a log will be created of all of the schedule changes to validate the recovery plan and in any future Time Entitlement Analysis (TEA); and
- "commercial issues" are to be resolved at a later date

In the fall of 2010, several of MassDOT's most important contracts utilized similar work sessions to recover time. As the benefit of these evaluations become evident, MassDOT will continue to consider these session as a tool for addressing projects that are experiencing significant delays.

2.C.4 – Quality Control Plan – Construction Schedule Review

The complexities and contractual implications associated with the Contractor Schedule review require the assistance of qualified construction schedulers. As mentioned in the sections above, over the past year MassDOT has utilized professional schedulers to advance the understanding and utilization of the industry accepted standards. Due to the requirements of the Acts of 2008, MassDOT has assigned a state employee to oversee all of the Project Controls Unit and, another state employee has been assigned to review the Contract Time Determination studies that have been generated by the Project Controls Unit. Additionally, for most ABP projects, additional QA is provided by one of the two area construction supervisors. These layers of oversight and scrutiny have been useful in seeking clarity in

the contract documents (prior to bid) and seeking clarity in alternatives that need to be examined as construction is progressing.

The Quality Control Plan (QCP) is being implemented on a case by case basis, and in accordance with the December 2008 Project Controls Report. These generally include an evaluation to assess the following aspects:

- Milestones, Access Restraints and Access Provisions Review
- Scope of Work review
- Logic review
- Float Review

2.C.5 – Schedule Contingency

Contrary to an aspect of the December 2008 Project Controls Report, there has yet to be any significant policy generated regarding the utilization of Schedule Contingency (an allotment of reserve time, built into each contract's performance measure and budget). An early ABP/MassDOT decision was made to not include any such schedule/time contingency, to force all parties to progress the work as quickly as possible. However, with the introduction of the Acts of 2009 (performance management), MassDOT will now be evaluating the utilization of this reserve and will do so in a transparent manner. Any established revisions to on-time goals, that would potentially include schedule contingency, will be based upon past experience and the ultimate initiative to constantly improve performance. Schedule contingency is often used by many Owners (DOT's and Capital Program Managers) to adequately account for reasonable schedule growth. No schedule contingency will be included in the Contractor's specified contract duration.

2.C.6 – Schedule Review Impacts

The recommendations, direction, and comments provided in MassDOT's review of schedule submittals are currently generated by an experienced, professional construction controls/construction scheduler. These reviews consider the contract documents, accepted construction practices, the overall goals of the ABP, the potential monetary impacts of changing the Contractor's plan, as well as project-specific plans, specifications, and special provisions.

SECTION 3 – CONSTRUCTION QUALITY

3.A.1 – Construction Quality Control & Quality Assurance

The objectives of this program will be as follows:

Formal construction quality control and quality assurance programs and procedures must be in place in order to manage and control the quality of construction. Historically, it has been the industry standard to require the construction Contractor to provide construction quality control, while the owner typically provides quality assurance oversight to ensure that the Contractor is effectively following and implementing their quality control plan. It is also important to ensure that the construction contractor's quality control requirements and responsibilities are clearly defined in each construction contract.

As part of the ABP Program, MassDOT is reviewing the Quality Control/Quality Assurance language and procedures to ensure they are tailored to meet the specific requirements and complexities of each individual construction contract. MassDOT has also begun efforts to create a Resident Engineers Field Manual that will provide direction on how to execute the Quality Assurance program and ensure Contractor quality.

The following steps are being implemented to improve Quality Control and Quality Assurance:

- Review of existing Contractor Quality Control specifications for construction contracts, making warranted improvements, and tailoring the specifications to specifically address the requirements of the Accelerated Bridge Program. These specifications will be included in all ABP construction contracts.
- Review of existing Construction Quality Assurance procedures, making warranted improvements, and tailoring the procedures to specifically address the requirements of the Accelerated Bridge Program.
- Improving training for field staff including holding Contractor Quality Control and Construction Quality Assurance refresher training sessions with all ABP construction personnel, to ensure that all construction personnel are intimately familiar with the requirements of the Contractor Quality Control construction contract specifications, and the Construction Quality Assurance procedures.
- Implementing Contractor Quality Control training sessions with construction Contractors prior to their performing work on construction contracts. The purpose of this training will be to ensure that all construction Contractors performing work on ABP construction contracts understand the requirements of the Contractor Quality Control specifications.